THIRTY-FIFTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF RHODE ISLAND

FOR

THE YEAR ENDING DECEMBER 31, 1912

PROVIDENCE:
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1912.

MEMBERS

OF THE

RHODE ISLAND STATE BOARD OF HEALTH.

	P. O. Address.	*Representing.*	*Term expires.*
ALEXANDER B. BRIGGS, M. D.	Ashaway	Washington Co.	Jan. 31, 1919
REV. GEORGE L. LOCKE	Bristol	Bristol Co.	" " 1916
RUFUS E. DARRAH, M. D.	Newport	Newport Co.	" " 1914
JAMES O'HARE, P. D.	Providence	Providence Co.	" " 1917
JOHN H. BENNETT, M. D.	Pawtucket	At large	" " 1914
R. MORTON SMITH, M. D.	Riverpoint	Kent Co.	" " 1915
WILLIAM L. HARRIS, M. D.	Providence	Providence Co.	" " 1918
GARDNER T. SWARTS, M. D.	Providence	Member, *ex-officio.*	

LABORATORIES OF THE BOARD.

BACTERIOLOGIST AND DIRECTOR.....GARDNER T. SWARTS, M. D.

CHEMIST.....GILBERT H. PRATT, S. B.

CLERICAL DEPARTMENT.

CHIEF CLERK.....LOUISE E. MERRILL.

CLERK OF VITAL STATISTICS.....HELEN R. ALMY.

GENERAL CONTENTS.

To the Honorable General Assembly:

In compliance with the General Laws, the Annual Report of the State Board of Health is hereby respectfully submitted.

GARDNER T. SWARTS, M. D.,
Secretary.

GENERAL REPORT.

The work of the State Board of Health during the year has been a continuation of the study of the various conditions pertaining to the public health of the State, utilizing the various improved methods of investigation which have been made available during the past decade. It is also one of the duties of the State Board of Health to examine physicians desiring certficates authorizing them to practice medicine and surgery in the State.

A more detailed report of the different lines of work will be found in the latter part of this report, the general report covering what may be termed a synopsis of the work.

CONTAGIOUS DISEASES.

During the year the monthly reports of the health officers of the several towns were received giving the number of cases of contagious diseases occuring in each city and town.

The diseases which are usually reported by physicians are scarlet fever, diphtheria and typhoid fever. Some few report cases of measles and whooping cough. In Newport and Providence, ordinances require a report of cases of tuberculosis, but this regulation is not well observed. Provision is made in the General Laws providing for the report of all cases of tuberculosis to the State Board of Health. During some years there appears an unusual prevalence of one or more of these communicable diseases. In 1912 there was a greater number of cases of scarlet fever and diphtheria than occurred the previous year. The number of cases of measles reported was more than twice as large as in the previous year. This may be due to an unusual spread of the disease, or it may be due to the increased

interest by physicians and health officers in seeing that this disease is reported. Typhoid fever cases appeared in no more than the average number.

LABORATORIES OF THE BOARD.

The chemical laboratory of the Board has continued under the direction of Gilbert H. Pratt, as chemist, and Henry H. Anderson, assistant chemist. The bacteriological laboratory has been in charge of Dr. Gardner T. Swarts, as chief bacteriologist, and Ruth O. Pierson has served as assistant bacteriologist.

WIDAL TEST FOR TYPHOID FEVER.

Examinations of specimens of a drop of blood taken from persons suspected of having typhoid fever were continued, serving to assist physicians in confirming a doubtful diagnosis.

During the year there were made 806 examinations, of which 273 gave a positive reaction.

TUBERCULOSIS.

The increased attention given to the diagnosis of tuberculosis by physicians has increased the number of cases in which examination of the sputum has been asked. For the protection of the community the work of examination of sputum from cases of suspected tuberculosis, free for physicians, was continued. This year, 1,923 specimens were examined, of which 486 showed the presence of the bacilli of tuberculosis. The work was commenced in 1894 and has been continued ever since, being of great value to physicians in confirming their diagnosis or correcting it in case of doubt.

Literature and directions for the care of those sick with the disease, have been sent to the physician in cases where tubercle baccili were found to be present and having cases of tuberculosis under their care, to be given by him to the patient or some member of the family at his discretion.

As a special precaution, spit cups for the use of those having consumption have been distributed free to all who apply for the same. As these can be destroyed with their contents at frequent intervals this serves as a valuable assistance in the prevention of the careless spread of the sputum which is a factor in the extension of the disease. The careless spitter is not only thus taught a means of securing cleanliness and safety for others, but he is also impressed with his opportunity to prevent the organisms being ingested or inhaled by himself and reproducing the disease in other parts of his own system in addition to the portion of the lungs already invaded.

The Newport Association for the Relief and Prevention of Tuberculosis which was organized March 19, 1904, has continued its work in a quiet way. The South Kingstown Health League, which was formed February 6, 1905, has continued also.

During the early part of 1906 a committee styled the "Committee on the Relief and Control of Tuberculosis of the Providence Society for Organizing Charity," was formed, which inaugurated a systematic attemp to organize an anti-tuberculosis campaign in that city.

This committee, on November 1, 1906, organized a district association or league under the title of the "Providence League, for the Suppression of Tuberculosis," and commenced an active campaign to carry out work in its field. This league has continued in active service ever since and utilized the tuberculosis exhibit and coöperation for a week's presentation in the city of Providence.

State Sanatorium.—Although this State institution is not in any way under the control of the State Board of Health, its functions are so primarily those bearing on the health of the State as influenced by tuberculosis, it seems proper to include in the report of this Board a concise statement of some facts pertaining to this institution.

During the year 449 patients have been treated. Of the 313 tuberculous patients discharged 21 were "apparently cured," 86 had the disease arrested, and 86 left without apparent betterment, including 8 deaths. The number of patients remaining at the end

of the year was 121. The daily average occupancy was 134 patients; the weekly cost per capita for operation of the institution was $9.61; the average daily cost for food per capita was $.368.

For operating the plant an appropriation of $60,000 was made available by the General Assembly

Hillsgrove Tuberculosis Hospital.—The branch hospital at Hillsgrove, conducted under the management of the St. Joseph's Hospital, continued to carry on the good work of caring for chronic and incipient cases alike. This is the only hospital in the State which will receive advanced cases from any part of the State. This retreat was opened in 1905. It receives annually a small appropriation from the State to assist in meeting the expenses of maintaining the institution.

DIPHTHERIA.

The practice of examining cultures taken from throats of suspected cases of diphtheria, inaugurated in 1894, has been continued.

During the year there were examined 2,013 specimens, of which number 370 gave a positive test for the presence of diphtheria bacilli.

Antitoxin.—Free antitoxin also has been distributed to physicians for use in cases of diphtheria when the patient was too poor to purchase the same. This has produced much relief from suffering and the saving of many lives. During this year 2,237 packages of 2,000 units were thus distributed.

MEETINGS OF THE BOARD.

Twelve meetings of the Board were held during the year. At these meetings the examinations presented by the candidates for license to practice medicine were considered, also various matters pertaining to the general work of the Board.

WORKING OF THE MEDICAL PRACTICE ACT.

Four examinations for license to practice medicine have been held. Fifty-three applications were received for examination; of these thirty nine passed, receiving the required 80 per cent., and fourteen

failed. Additional data, including the percentages obtained by the applicants given under the schools from which the candidates graduated, appears in another part of this report.

SMALLPOX.

During the year cases of small-pox were discovered, one in the city of Providence, the conditions associated therewith being described by the Superintendent of Health of Providence in his report, and cases which occured in Pawtucket, both of these latter being employed in the city of Providence.

RABIES.

With the outbreaks of rabies in neighboring states several dogs affected with this disease wandered into or passed through this State inflicting bites upon human beings, and upon other dogs and cattle. This necessitated the enactment of ordinances in the different cities and towns for the control of the spread of hydrophobia. The regulations varied in the different towns, requiring the muzzling of dogs for variable periods. The destruction of cattle which have been attacked, and the treatment of people who had been bitten utilizing the Pasteur anti-rabies methods, formed a part of the control of the disease. The various experiences of the several towns with this disease is further described in this report.

APPROPRIATIONS.

For the year 1912 there was appropriated by the General Assembly, for the general expenses of operation of the Board $17,000.

PERSONNEL OF THE BOARD.

The term of Samuel M. Gray, C. E., member of the Board from Providence county, after a service of thirty years, expired this year.

Governor Aram J. Pothier, with the advice and consent of the senate, appointed Dr. William L. Harris, of Providence, for a term of six years, ending January 31, 1918.

EXAMINATION OF WATER SUPPLIES.

The regular routine examination of all water supplies of the State has been continued and valuable data is being acquired which is of practical use in showing the variations in the supplies which may occur from time to time. A tendency to deterioration in any supply can be discovered by these tests which have been made monthly on all supplies, and oftener in some cases. The proper authorities are notified of changes observed. They are then in a position to take action on the facts presented, and suggestions made, toward any improvement of conditions.

There are twenty-four public water supplies, the waters of which are examined chemically and bacteriologically, monthly, and in some cases oftener. The samples taken for analysis are secured from the source of the supply and at some point on the delivery service pipes in nearly every case. This gives forty-three sampling points, which with twenty-two control examinations on filters each month, and twenty-five special samples, makes the annual number of examinations of drinking water 805.

A copy of the analysis is sent to those having charge of the plants, when so requested. In only four instances are the public supplies owned by the cities and towns where the water is used; namely, the cities of Providence, Pawtucket and Woonsocket, and the town of Westerly.

In addition to the examination of the supplies of cities and towns, numerous analyses have been made of waters used by manufactories in the State. These have been made upon request of the owners of the plants, for the purpose of determining the advantages of greater purity of one of two or more available supplies. The General Laws provide that all "manufacturing establishments shall furnish fresh drinking water, of good quality, to which their employees shall have access during working hours." It is believed to be the

duty of the Board to assist and protect the employees, as well as the employer, by making determinations of the quality of water which may be in question. These examinations are included in the twenty-five special samples above mentioned.

Providence.—Since 1894 the Board has made monthly analyses of the water supply of the city of Providence, which is taken from the Pawtuxet river.

The samples have been taken at five different points:—at the Pettaconset pumping station; at Washington village, on the south branch, at a point above any known source of contamination; at the village of Hope, on the north branch of the river, above any possible source of contamination from villages, residences, or manufactories. Samples have also been taken from the filtered-water basin at Pettaconsett and from a tap in the laboratory of the State Board of Health in Providence. These examinations are now made twice every month, on the second and fourth Wednesdays. Samples from the stations at Washington and Hope have been discontinued since 1910. These reports have been of considerable service in determining the quality of the supply at various points, and permitting of comparison of the waters and the possibility of pollution at any point between the sources of supply and the intake, and as served to the consumer.

At a time when the question arose as to the necessity of filtering the supply before serving it to the city, a proposal was presented urging that it might be more desirable to take the supply direct from reservoirs to be constructed on one or both of the branches of the river above possible sources of pollution. Owing to the distance of the heads of the river, however, and to the probable excessive cost of acquiring control of the water-shed, the proposition of obtaining a supply from the upper branches was dropped.

By reference to the published results of these examinations, it is determined that a vast amount of contamination has entered the water between the sampling points on the two branches and the intake or pumping station. This contamination comes largely from

the surface drainage from fields and villages along the stream, and from the large amount of sediment which has accumulated in the bed of the river, which has been introduced as mill-wastes from the mills along the banks of the stream. While the stream is running evenly the sediment is caught in the various reservoirs at the dams connected with the several industries along the banks of the stream. As soon as a mill starts up a rush of water follows, stirring up and carrying along the sediment which was lying in the shallow stream. This mixture is received at the pumping station, giving a polluted water.

An examination of this water supply has been obtained by the engineer's department of the city of Providence for many years, one sample being taken on the first and fifteenth of every month. The averages of these examinations through 1901 will be found in the report of this Board for 1901.

The averages on samples examined by this Board during the last six years, 1907-1912, are given in this report. This data for years previous to these, and detailed monthly figures, may be found in the reports for the respective years, or obtained from the laboratory records. The 1906 report contains the averages for 1902-1906, and those from 1900-1904 will be found in the report for 1904.

After many years of agitation it was finally concluded that it would be desirable and that it was necessary to filter this supply.

The river formed by the two branches flows through densely populated mill villages, representing a population of perhaps 15,000 inhabitants. None of these villages have a sewerage system. The surface wash of the streets and of some stables, hen-yards, etc., flow directly into the stream.

Many of the dwellings and all of the mills, of which there are many, are situated on the banks of the stream, and are liable to be a source of direct and at times dangerous pollution by the dumping of refuse matter into the stream as a quick means of disposing of the same.

The intake at the pumping station is located about eight miles below the beginning of this long line of possible pollution.

That filtration of this supply was desirable was shown by the outbreak of two epidemics of typhoid fever, one in 1882 and the other in 1888, which were directly traceable to the water supply. In the latter epidemic it was discovered that the attendants upon a case of typhoid fever which existed in a cottage on the banks of the stream at Natick had utilized the river for a dumping place to quickly dispose of the fecal matter of the patient. Within fourteen days from the commencement of this procedure an epidemic started in the city of Providence, and over 250 cases were reported.

Agitation as to the need of filtration of this supply commenced shortly after this and the question received attention at intervals until 1902, when after rejecting the recommendation of a committee of the Common Council that a mechanical filter plant be installed, a contract was awarded for the erection of a filter of slow sand type.

Water was pumped onto the first completed bed Nov. 6, 1905, over three years after the contract was let, and onto the last of the six beds about the middle of December of that year from which time the city of Providence has been supplied with filtered water

It was found that the six uncovered beds provided for the work were not only inadequate in area, but that owing to the freezing of water on the surface of the beds it was found necessary to have constructed four more beds and the whole ten covered with reenforced concrete.

The results obtained on the samples of water taken for analyses from a tap in the city and on the filtered water at the filter plant, have been very satisfactory and the filtration efficiency as shown by comparison of the results obtained on raw and filtered water has been up to the standard of good plants.

The odors arising from the presence of "algae" in Hope reservoir have been the cause of considerable complaint and have made a large number of people unjustly suspicious of the otherwise good water.

While the supply of the city of Providence is the largest and most important of any in the State, inasmuch as it supplies the largest

population, it was believed by the Board that it was equally important that all potable public water supplies in the State should be examined periodically, first to determine their fitness for a drinking water, and second, to be posted as to any change which might take place in the character of the water at any time and especially in the presence of an epidemic of any water-borne disease, as the Board would be in a position to determine if any deterioration in the character of the water had occurred at the time, and if it might have any influence in the production of the epidemic.

Accordingly, since 1900, chemical and bacteriological examinations of all the public water supplies have been made monthly, and in the case of the Providence supply, twice a month. These were found to vary in quality from what might be considered as perfect, to a condition which indicated that the continued use of the water might at any time be dangerous to the health of the consumers.

The information thus obtained indicated that one supply, that of East Providence, ought to receive immediate attention, and purification of this supply was secured by means of mechanical filtration. The studies of this process have been available to assist in the installation of other filter plants desiring to use this form of filtration. This system has been found to be successful and manageable.

Water supplied by the East Providence Water Company, a private corporation, is secured from the Ten Mile River. This river which is a narrow stream, but having a large drainage area, rises in the State of Massachusetts, flows through several manufacturing towns and receives manufacturing and household sewage wastes which originally was a serious pollution. The attention of the owners of the water company being called to this possible source of danger to its consumers, by the Rhode Island State Board of Health, immediate steps were taken, regardless of cost, to purify this supply before delivering the water to the consumers. A rapid mechanical filter was installed, which included two circular wooden tanks which has since been increased to four such tanks. Alum and the necessary amount of soda are applied to the water to effect complete "coagu-

ation," and the water delivered from the filters reduces the color of the river water, which in 1912 averaged 60, to an average of 6 on the color scale and with a bacterial purification of 99.5%, thus giving to the consumers a clear, white and safe water for drinking as well as for other domestic and for manufacturing purposes. This was the first mechanical filter installed in this State or in New England, and has since its installation 14 years ago, served the purpose for which it is intended. This company supplies a large part of the town of East Providence and nearby villages.

The town of East Greenwich is supplied by a private water company. The water is taken from a small stream having a fair area of water-shed, which is comparatively free from habitation or chance pollution. The water as pumped from the stream is a practically pure water although there is a slight amount of color at certain seasons of the year.

The water company desiring to perfect the character of the water still further, erected a mechanical pressure filter capable of caring for the whole supply, the consumers in this district, East Greenwich and vicinity, thus securing a chemically and bacteriologically pure and white water. Alum and soda are used to a limited extent in the process. The filtration is rapid, being governed by pressure and accomplishes equally good results as the open mechanical filtration beds used at three other places in the State.

A study of the results and the working of these mechanical filtration plants has been continuously made by the chemist of the Board, and any possible divergence from the proper working of any plant is noted and the water company's attention called to the necessity of rectifying any irregularity which might occur. This is done as a protection to the consumers, but at the same time is a convenience and assistance for safety to the water companies who coöperate with the Board to secure perfect results.

In the Pawtuxet Valley there are three public water supplies. These are operated by private water companies. The water-sheds

of all three are practically free from possible contamination or pollution, being comparatively free from inhabitants and industrial plants. They are called the Pawtuxet Valley Water Company, the Warwick and Coventry Water Company, and one known as Knight's Spring. The results of the analyses of this group will be found in the following tables under the heading of Pawtuxet Valley Water Supply, and indicate that they are of very good quality.

Manville is a mill village situated in the towns of Lincoln and Cumberland. A portion of the town is supplied from an extension of the mains of the Woonsocket Water Company. Many of the houses are owned by the Manville Company and are occupied by the operatives in the mills. Those houses on the side of the river not reached by the Woonsocket supply, namely, the Cumberland Hill side, are supplied with water through pipes leading from a supply which is owned by the Manville Company.

The source of the supply is partly from the surface flow of a low area called Ballou's Meadows and partly from a spring called Colwell's Spring. The brook flowing through the meadow is received in a small reservoir near the village, and the water from the spring is directed into this reservoir from which it is piped directly to the mill and the cottages.

The analyses of water from the faucets in the village vary very decidedly according to whether the supply is mostly from the brook or from the spring. The presence of B. coli communis at times can be accounted for by the pasturage about the brook.

The supply of Westerly, which is taken from driven wells, continues to be the best water for a public supply which is being delivered in the State. This supply is owned by the town. The only other supplies under municipal control are those of the cities of Providence, Woonsocket and Pawtucket.

The Block Island water supply, although low in color, contains numerous growths of algae from time to time, which produce disagreeable odors and taste in the water. The quality of the water is good.

The supply of Woonsocket is received from a large water-shed which is owned or controlled by the city. The water-shed receives occasional inspection by the water department. Practically no inhabitants are located on the area. The supply is a sanitary one as far as the chemical and bacteriological analyses show, but owing to the nature of the surrounding land and the bottom of the reservoirs the water has a high color and a vegetable or woody taste. The high color is produced by extraction from the vegetable growth which is continually soaking in the reservoirs.

The supply of the State Sanatorium was examined every three months during the year and was shown to be a soft, pure supply, low in color, and in every way satisfactory except for a very faintly vegetable or unpleasant odor occasionally, due to the presence of certain algae (diatoms). The supply is taken from Wallum Lake, located near the sanatorium.

The Pascoag supply is taken from springs on a side hill which are collected in a gallery and then pumped from a pump-well. At other times when the supply from these springs is inadequate, the company utilizes two artesian wells which are driven near the pumping station, this being mixed with the water from the springs in the pump-well. During the year an extension of the service has been made and an increased source of supply secured from two wells located in Harrisville. The supply from the springs is soft and is a normal water for the district. As would be expected, the water from the deep wells is much harder, but not excessively so. Both supplies are pure.

The water supply of the city of Newport is taken from a water-shed which is open to accidental pollution from cows, hens and ducks.

The mechanical filter plant installed in May 1910, continues to supply pure water. Alum, hypochlorite of lime and aeration are used in the purification of the supply.

In July 1910, the Newport Water Works installed a mechanical pressure filter in connection with the supply furnished the town of Jamestown.

The supply is secured from a surface reservoir located about two miles north of the town on the Island of Conanicut. The water is high in color. The action of the filter, when properly operated, is however, capable of removing the excess of color as well as reducing the number of bacteria which might be found in the supply and reducing the possibility of contamination of the water supplied to the consumer.

The supply at Wakefield and Narragansett Pier is derived from a flat water-shed, not thickly inhabited, but is impounded in reservoirs where much coloring matter is taken up from the decay of vegetable matter, such as stumps, trees and leaves. The only means of securing a white potable water with this supply would be by the use of filtration. Owing to the small consumption, the expense necessary for this purpose might not be warranted at the present time. Several years ago a mechanical filter was installed and then abandoned after a few weeks use on account of objection by some consumers to the use of alum in the process.

The Bristol and Warren Water Works, supplying the towns of Bristol and Warren, derives its supply from an impounded surface flow. The reservoir being flooded over stumps and decaying vegetable matter, delivers considerable decomposed organic matter to a lower reservoir through the Kickemuit River.

The accumulation of this material for many years in the lower reservoir had produced a condition whereby the water held in storage had become increased in color and in all organic constituents.

The supply, which was subject to litigation for so many years, was secured through the interest of a prominent citizen of Bristol, and the Bristol and Warren Water Company formed. A model mechanical filtration plant was installed in 1908 with new pumps and machinery, thus insuring to the towns of Bristol and Warren a supply of pure water, a condition which had not existed since the first introduction of the supply from the Kickemuit River.

The plant includes six re-inforced concrete tanks, containing sand of a certain size and sharpness, and all the necessary mixing

tanks and feed pumps for supplying the chemicals, alum and soda to the water for "coagulation" of the organic matter before filtering. The filtering capacity of the plant is 3,000,000 gallons per day. The average dose of alum required has been 1.9 grains per gallon, and artificial alkalinity in the form of soda or "precipitated lime" has been used in amount sufficient to maintain a proper alkalinity in the filtered water, varying with the character of the water at different times. No more alum is used than is required for the process, hence none gets into the drinking supply. The working of the plant is satisfactory except during the fall and winter months when there is a tendency of the sand beds to become porous, necessitating more frequent washing of the sand beds.

With the rapid increase of consumers the water company found that the plant was pressed to its full capacity. During 1909, owing to the light rainfall, it became necessary to secure a temporary supply from a nearby pond, the water in which was determined by the State Board of Health to be a safe and sanitary supply for drinking purposes. The water-shed of the pond was placed under close inspection to prevent careless or accidental pollution.

As a result of this necessity the water company secured an increased supply by impounding the "Shad River" by a dam and connecting this new reservoir by six miles of pipe line with the lower reservoir, thus assuring ample supply for a long time to come.

The character of the water thus acquired is similar in character to the water in the original reservoir, but contains less organic matter at the present time.

The water supply of Pawtucket remains of the same general quality and stands well with the average unfiltered supplies. The city continues to make an inspection of the streams contributing to the supply. It still utilizes the so-called filter, constructed with large stones and pieces of charcoal for the assumed purpose of filtering the water, an impossible result with such a form of filter.

This periodical examination of these water supplies gives valuable working data to the Board in the presence of a prevalence of any water-borne or communicable disease.

While typhoid fever, paratyphoid and cholera are the only two diseases which are considered as water-borne at the present time, the periodical examination gives information to the Board which can be acted upon promptly to the advantage of any town or city which has been afflicted. If the causation of an epidemic is directly traced to a water supply, the records of the results of the chemical and bacteriological tests allow of certain deductions of exclusion or possible inclusion as a causative factor, thus permitting of immediate determination and also more earnest effort in other directions to determine a possible source of infection.

The following tables present the results of the periodical analyses of the different supplies. The supplies are given in alphabetical order, and it will be noted that the tables give the yearly average results from 1907-1912. There are also presented the maximum and minimum figures for each determination obtained on the analyses at each sampling point. In connection with the maximum and minimum figures for the loss on ignition and fixed residue, also in the case of albuminoid ammonia in solution and in suspension, it will be noted that the figures given would not always add up to the total solid and total albuminoid figures, respectively. Accordingly in the tables appear also the figures which were actually obtained on the samples showing the maximum or minimum total, these figures being given above the true maximum and minimum.

The figures for residue on evaporation, hardness and alkalinity determinations are to the nearest .5 parts per million, that being the accuracy of the process.

These tables are given in parts per million and any comparisons with old reports should be made with that point in mind.

Albion Water Supply.

(Sample from tap in mill-village of Valley Falls Company.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot)	Residue on Evaporation.			Ammonia.				Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.	Chlorine.	As Nitrates.	As Nitrites.					
1908	11	Feb.-Dec.	none.	none.	1	none.	77.5	28.5	49.0	.009	.018	....	....	8.5	2.52	.000	.1	27.0	12.5	86	0
1909	12	Jan.-Dec.	none.	none.	3	none.	90.5	34.0	56.5	.019	.022	....	....	9.3	3.11	.000	.3	31.5	15.5	159	0
1910	12	Jan.-Dec.	none.	none.	3	none	83.5	33.0	50.5	.026	.019	..	.	9.7	2.80	.002	.2	31.0	12.0	265	0
1911	12	Jan.-Dec.	none.	none.	1	none	94.0	41.5	52.5	.009	.012	....	....	12.4	3.64	.001	.1	31.5	9.0	5	0
1912	12	Jan.-Dec.	none.	none.	0	none	99.5	35.5	64.0	.006	.012	....	...	14.3	3.61	.000	.1	30.5	8.0	5	0
1912 Maximum			none.	v. sl.	2	v. f. earthy.	122.5	50.5 50.5	72.0 72.0	.010	.018	....	....	16.6	5.00	.001	.2	36.5	10.5	21	0
1912 Minimum			none.	none.	0	none.	81.5	18.5 18.5	63.0 54.0	.000	.001	....	....	11.4	2.00	.000	.0	23.5	6.0	0	0

v. sl.=very slight. v. f.=very faint.

This sample was first examined in February, 1908. The supply was originally from a number of springs on the side hill near the mill. In December, 1909, new artesian well was put down and subsequent to that time the supply has been from that source.

Block Island Water Supply.

(Sample from tap in town.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	10	Feb.-Dec.	sl.	sl	45	dist. veg. and of micro-org.	91.0	25.0	66.0	.028	.257	.161	.096	27.3	.03	.000	2.9	17.5	8.0	710	0
1908	11	Jan.-Dec.	v. sl	sl. to cons.	30	f. veg.	88.5	26.0	62.5	.011	.171	.120	.051	29.1	.04	.001	1.5	17.5	6.5	360	0
1909	10	Jan.-Dec.	sl.	sl. also crustaceans	37	f. to dist. veg. and unpl.	106.0	33.5	72.5	.021	.274	.177	.097	33.6	.04	.000	2.9	20.5	9.0	1429	0
1910	11	Jan.-Dec.	v. sl.	sl. to v. sl.	24	v. f. to f. veg.	95.5	25.5	70.0	.012	.141	.120	.021	31.8	.06	.000	1.3	20.0	8.5	285	0
1911	10	Jan.-Dec.	none. to v. sl.	none to v. sl.	13	v. f. to f. veg. to unpl.	101.5	28.0	76.5	.007	.112	.103	.009	31.0	.08	.000	1.1	28.0	16.5	1386	0
1912	10	Feb.-Dec.	v. sl.	v. sl.	19	dist. veg. to unpl. and of micro-org.	94.5	19.0	75.5	.120	.190	.156	.034	28.3	.07	.000	2.4	24.0	15.0	1841	0
1912 Maximum			sl.	sl.	50	decid. disag., micro-org.	143.5	32.5	111.	.960	.612	.430	.182	41.4	.15	.002	8.6	35.0	29.5	13600	0
1912 Minimum			none.	none.	6	f. veg.	76.0	19.5	56.5	.004	.074	.074	.000	23.0	.00	.000	.6	12.5	3.5	1	0

V. sl.=very slight; sl.=slight; cons.=considerable; micro-org.=micro-organisms; v. f.=very faint; f.=faint; dist.=distinct; decid.=decided; veg.=vegetable; unpl.=unpleasant; disag.=disagreeable.

During 1912 practically all samples showed a little amorphous matter and micro-organisms were present in three of the samples and included principally dinobryon and diatoms.

Bristol and Warren Water Supply.

Sample from reservoir at East Warren, being the Kickemuit River and the raw water applied to the filters, before addition of chemicals.

(Parts per 1,000,000.)

Yearly Average	No. of Samples.	Date of Collection	Appearance.			Odor. (Hot)	Residue on Evaporation.				Ammonia.			Nitrogen.								
			Turbidity	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension	Chlorine	As Nitrates	As Nitrites	Oxygen Consumed	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
1907	12	Jan.-Dec.	v. sl.	sl.	92	decid. veg.	70 0	29 0	41 0	.037	.275	.238	.037	10 0	.03	.000	11 3	15.5	6 0	1390	
1908	11	Jan.-Dec.	sl.	sl.	74	dist. veg.	70 0	29 0	41 0	.024	.288	.248	.040	10 3	.03	.001	9 6	16 5	6 0	1388	0
1909	12	Jan.-Dec.	sl.	sl.	86	decid. veg.	91 5	37.5	57 0	.071	.304	.256	.048	15 9	.07	.000	10 7	21 5	5 0	1050	0
1910	12	Jan.-Dec.	sl.	sl.	80	decid. veg.	81 5	32 0	49 5	.032	.309	.271	.038	13 9	.01	.000	10 6	20 5	6 0	308	0
1911	12	Jan.-Dec.	sl.	sl	74	decid. veg.	73 0	29 0	44 0	.027	.301	.273	.031	8 6	.05	.000	10 5	19 5	6 5	1272	0
1912	12	Jan.-Dec.	v. sl. to sl. micro-org.	sl.	79	decid. veg. and of micro-org.	65 5	24 5	41 0	.039	.324	.275	.049	7 9	.06	.000	10 0	16 5	7 5	1794	0*
1912 Maximum			sl. micro-org.	cons. micro-org.	160	v. decid. veg. and of micro-org	88 0	25 0	63 0	.126	.508	.410	.098	11 8	.19	.001	16 5	28 5	13 0	18700	+
1912 Minimum			none.	none.	47	f. veg.	50 0	13 5	36 5	.006	.186	.172	.014	1 5	.00	.000	7 2	8 0	2 5	16	0
								13 5	28 0			.172	.010								

V. sl. = very slight; sl. = slight; cons. = considerable; f. = faint; dist. = distinct; decid. = decided; v. decid. = very decided; veg. = vegetable; micro-org. = micro-organisms.

During 1912 the water at all times showed miscellaneous micro-organisms and amorphous matter. Among the forms present were dinobryon, chlamydomonas-melosira, diatoms, anabaena, sprogyra, etc. *Occasional. + .

Bristol and Warren Water Supply.

(Sample from the clear well at pumping station, being the filtered water from all filters.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot)	Residue on Evaporation.		Ammonia.					Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Alum, Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.	Chlorine.	As Nitrates.	As Nitrites.						
1908	6	July-Dec.	none.	none.	12	f. veg.	81.5	20.5	61.0	.010	.155	145	.010	13.3	.01	.001	3.5	20.0	3 5	264	0	Al.=neg. Iron=.05.
1909	12	Jan.-Dec.	v. sl.	none to v. sl.	21	f. veg.	103.5	22.0	81.5	.055	.131	.110	.021	16.8	.07	.000	3.3	25.0	3.5	200	0	Al=neg. to low+ Iron=.12
1910	12	Jan.-Dec.	none.	none.	13	f. veg.	91.5	20.0	71.5	.024	.120	118	.002	14.5	.04	.000	2.9	22.0	5.5	449	0	Al.=neg.= occasional v.low+ during porous beds. Iron=.07.
1911	12	Jan.-Dec.	none+	none.	11	dist. veg.	81.5	19.5	62.0	.021	.129	.127	.002	8.8	.05	.000	3.2	27.5	6.5	167	0	Al.= neg =occasional neg.? Iron=.06.
1912	12	Jan.-Dec.	none.	none+	11	dist veg.	74.5	14.5	60.0	.027	.119	.119	.000	8.3	.05	.000	2.7	25.0	7.0	116	0	Al.=neg.=occasional neg.? Iron=.07.
1912 Maximum			sl.	sl.	22	decid. veg.	99.0	19.0	80.0	.080	.176	.....	.....	12.0	.16	.001	4.5	37.5	11.5	880	0	Iron=.11. Al=v. low+
1912 Minimum			none.	none.	7	f. veg	57.0	14.5 9.5	42.5 42.5	.008	.066	.....	.....	5.6	.00	.000	1.8	12 5	3.5	0	0	Iron=.03. Al=neg.

V. sl.=very slight; sl.=slight; veg.=vegetable; neg.=negative; v. low=very low; f.=faint; dist.=distinct.

Bristol and Warren Water Supply.

(Sample from tap in the office of the town clerk, Bristol.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot)	Residue on Evaporation.			Ammonia.				Albuminoid.		Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.	Alum, Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Total	In Solution.	In Suspension.	Chlorine.	As Nitrates.	As Nitrites.							
1907	12	Jan.-Dec.	sl.	cons.	94	decid. veg.	72.0	29.0	43.0	.026	.276	.226	.050	9.0	.03	.000	11.0	15.5	7 0	1,980	‡	
1908	*5	Jan.-May	sl.	sl.	74	dist. veg.	51.5	22.0	29.5	018	.196	.172	.024	6.9	.04	.000	8.3	11.5	5.5	510 0	x	Iron=.11.
	†6	July-Dec.	none.	v. sl.	16	f. veg.	79.0	18.5	60.5	.006	.149	.130	.019	10.6	.02	.000	3.3	21.5	4 5	152 0		Al=neg.
1909	12	Jan.-Dec.	v. sl. to sl.	v. sl.	27	f. veg.	105 5	22.0	83.5	.044	.132	.103	029	17.1	.08	.000	3.5	24.5	5.0	317 0		Al=neg.tolow+ Iron=.36
1910	12	Jan.-Dec.	v. sl.	v. sl.	19	f. veg.	91.5	20.5	74.0	.017	.118	.108	.010	14 8	.04	.000	2.9	23 0	6.5	338 0		Al.=neg.,§ Iron=.12.
1911	12	Jan.-Dec.	v. sl.	v. sl.	16	f. to dist. veg.	85.5	20.5	65.0	.015	.127	.121	.006	9.2	.05	.000	3.4	27.0	6.5	93 0		Al.=neg.?eneg.? Iron=.24.
1912	12	Jan.-Dec.	none to v.sl. iron	v. sl. to sl.	15	dist. veg.	69.0	14.0	55 0	.024	.126	.116	.010	8.0	.06	000	3.1	26.0	8.0	92 0		Al.=neg.? to v. low +; Iron=.23
1912 Max	...	...	deeid.	cons. iron.	30	dist. of micro-org.	100.0	20.0	80.0	.092	.200	.184 .016		11.2	.17	.001	5.3	40.5	14.0	635 0		Iron.=.81, Al.+
1912 Min.	...	...	none.	none.	7	f. veg.	60.0	15.5 11.5	44.5 44.5	.008	.061	.064	.000	5.4	.00	.000	1.9	14.5	5.0	1 0		Iron=.10 Al.=neg.

*Before filtering supply. †After filtering supply. §Occasional v. low + during porus beds. ‡Presumptive +

V. sl.=very slight; cons.=considerable; f.=faint; dist.=distinct; decid.=decided; veg.=vegetable; micro-org.=micro-organisms; neg.=negative. x=To presumptive +.

East Greenwich Water Supply.

(Sample from intake at Hunt's River, being the raw water applied to the filters, before addition of chemicals.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Appearance. Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.					
1909	12	Jan.-Dec.	none.	v. sl. to. sl.	38	f. to dist. veg.	43.5	14.0	29.5	.016	.080	.071	.009	4.6	.08	.000	3.7	7.5	7.0	770	0 to +
1910	12	Jan.-Dec.	none.	v. sl.	35	dist. veg.	40.0	13.5	26.5	.011	.085	.079	.006	4.6	.06	.000	3.7	9.0	6.5	480	+ to 0
1911	12	Jan.-Dec.	none.	v. sl.	49	dist. veg.	42.5	17.0	25.5	.013	.099	.093	.006	4.6	.04	.000	5.5	9.0	5.0	565	+ to 0
1912	12	Jan.-Dec.	none. to v. sl.	v. sl. to sl.	43	dist. veg.	41.5	13.0	28.5	.011	.109	.092	.017	4.7	.06	.000	4.5	7.0	6.0	1,320	0 to +
1912 Maximum			decid.	sl.	78	v. decid. veg.	60.0	19.5	40.5	.016	.290	.206	.084	6.6	.10	.001	7.8	12.5	10.0	11,900	+
1912 Minimum			none.	v. sl.	18	f. veg.	31.0	10.5 9.5	20.5 20.5	.004	.052	.052	.000	3.7	.00	.000	1.3	1.5	2.0	9	0

V. sl =very slight; sl.=slight; decid.=decided; f.=faint; dist.=distinet; decid.=decided; v. decid.=very decided; veg.=vegetable.

East Greenwich Water Supply.

(Sample from outlet of filters.)

Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot)	Residue on Evaporation.				Ammonia.			Nitrogen.			Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Alum, Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	In Solution.	In Suspension.	Chlorine.	As Nitrates.	As Nitrites.						
1909	12	Jan.-Dec.	none.	none.	3	v. f. veg.	56.0	8.5	47.5	.009	.022	....	....	4.5	.10	.000	.5	8.5	9.0	16	0	Al.=neg., occasional low + Iron=.07.
1910	12	Jan.-Dec.	none.	none.	5	v. f. veg.	55.5	9.0	46.5	.009	.027	....	....	4.7	.11	.000	.7	9.5	10.0	29	0	Al.=neg. occasional v. low + Iron=.05.
1911	12	Jan.-Dec.	none.	none.	5	f. veg.	60.0	9.5	50.5	.009	.028	....	....	4.8	.07	.000	.8	10.0	11.0	14	0	Al.=neg., occasional neg? Iron=.05
1912	12	Jan.-Dec.	none.	none.	4	f. veg.	56.5	7.5	49.0	.005	.026	....	....	5.0	.11	.000	.6	8.0	11.0	10	0	Al.=neg. occasional v. low + Iron=.07
1912 Maximum			v. sl.	v. sl.	10	dist. veg.	82.0	7.0 9.0	75.0 75.0	.010	.060	....	....	6.6	.20	.000	2.2	12.5	16.0	375	0	Al.=low + Iron=.20
1912 Minimum			none.	none.	2	none.	42.0	7.5 4.5	34.5 34.5	.000	.008	....	....	4.3	.05	.000	.4	5.0	8.0	0	0	Al.=neg. Iron=.00

V. sl.=very slight; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable; Al.="alum;" neg.=negative; v. low=very low

East Greenwich Water Supply.

(Sample from tap in town.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance			Odor. (Hot)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.	Iron.	Alum.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.							
1907	11	Jan.-Dec.	none.	v. sl.	41	dist. veg.	41.0	13.5	27.5	.007	.082	.074	.008	3.9	.07	.000	4.2	10.5	8.5	79	0	.....	.....
*1908	6	Jan.-June.	v. sl.	v. sl.	35	dist. veg.	40.0	13.5	26.5	.008	.073	.061	.012	4.5	.18	.000	3.4	9.5	7.0	141	0	.....	.....
†1908	6	July-Dec.	none.	none.	9	dist. veg. and earthy.	50.0	12.5	37.5	.003	.038	.032	.006	4.9	.10	.000	1.4	13.0	8.0	467	0	.08	Neg.
1909	12	Jan.-Dec.	none.	none.	5	v. f. veg.	56.0	9.0	47.0	.008	.028	.026	.002	4.5	.14	.000	.6	8.0	10.5	77	0	.12	Neg.
1910	12	Jan.-Dec.	none.	none.	6	v. f. to f. veg.	58.0	9.5	48.5	.008	.028	.026	.002	4.8	.11	.000	.7	9.0	11.5	26	0	.07	Neg., occasional v. low+
1911	12	Jan.-Dec.	none.	none.	8	f. veg.	63.5	10.0	53.5	.007	.028	.027	.001	4.8	.09	.000	1.1	10.0	13.0	63	0	.07	Neg., occasional neg.
1912	12	Jan.-Dec.	none.	v. sl. iron.	7	f. to dist. veg.	59.5	8.0	51.5	.004	.029	.028	.001	4.9	.11	.000	.9	7.5	12.0	95	0	.14	Neg., occasional v. low+
1912 Max	...	.....	v. sl. iron.	v. sl. iron.	14	dist. veg.	82.0	7.5 11.0	74.5 74.5	.014	.088	.078	.010	6.0	.17	.000	2.8	11.0	17.5	1,040	0	.32	Low+
1912 Min	...	.....	none.	none.	0	none.	40.5	6.5 5.0	34.0 34.0	.000	.010	.010	.000	4.3	.07	.000	.3	5.0	8.0	0	0	.07	Neg.

V. sl.=very slight; v. low.=very low; veg.=vegetable; v. f.=very faint; f.=faint; dist.=distinct; neg.=negative.

*While unfiltered. †While filtered.

East Providence Water Supply.

(Sample from Ten Mile River, Hunt's Mills, being the raw water applied to the filters, before addition of chemicals.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	decid.	sl.	66	dist. veg.	69.5	23.5	46.0	.092	.253	.190	.063	6.8	.17	.006	7.2	17.0	8.5	19,700	+
1908	12	Jan.-Dec.	sl.	v. sl. to sl.	60	dist. veg.	71 0	23.0	48.0	.096	.230	.180	.050	8.5	.25	.008	6.3	18 5	8.5	2,040	+
1909	12	Jan.-Dec.	sl.	v. sl. to sl.	60	dist. veg.	84.0	25.0	59.0	.215	.244	.180	.064	11.6	.35	.010	6.1	22.0	8.5	6,040	+
1910	12	Jan.-Dec.	decid.	sl.	67	dist. to decid. veg. and unpl	90.5	25.5	65.0	.243	.287	195	.092	12.7	.29	.010	6 7	23.0	10.0	5,665	+ to 0
1911	12	Jan.-Dec.	sl.	v. sl. to sl.	65	dist. to decid. veg. and unpl.	88.5	28.5	60.0	.212	.258	.217	.041	11.4	.34	.008	7.4	25 5	10.0	6,070	.0; Occasional. +
1912	12	Jan.-Dec.	sl.	v. sl. to sl.	60	decid. veg.	85.0	20.0	65.0	.118	.229	.189	.040	12.1	.28	.007	6.1	24.0	10.5	7,485	+ to 0
1912 Maximum			decid. micro-org.	sl. micro-org.	150	v. decid. veg. and of micro-org.	125.5	20.0 28.0	105.5 105.5	.360	.356	.321 .324	.032 .092	20 6	.50	.014	11.4	34.0	17.5	58,600	+
1912 Minimum			v. sl.	v. sl.	30	f. veg.	52.0	20.0 13.0	32.0 32.0	.016	.144	.120 .120	.024 012	5.4	.08	001	2.9	15 5	5.5	61	0

V. sl.=very slight; sl.=slight; decid.=decided; micro-org.=micro-organisms; f.=faint; dist.=distinct; v. decid.=very decided; unpl.=unpleasant; veg.=vegetable.

During 1912, the water at all times contained amorphous matter and miscellaneous micro-organisms. Among the forms noted were dinobryon, synura, diatoms, protozoa, etc.

East Providence Water Supply.

(Sample from outlet of different filters.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.	Iron.	Alum.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.							
1907	12	Jan.-Dec.	none.	none.	6	f. veg.	71.5	12.5	59.0	.085	.067	....	....	7.2	.23	.006	1.3	17.5	7.5	124	0	.....	Neg.
1908	12	Jan.-Dec.	none.	none.	6	f. veg.	72.0	14.0	58.0	.094	.069	....	....	8.6	.29	.007	1.3	19.5	6.0	36	0	.07	Neg. Occasional trace.
1909	12	Jan.-Dec.	none.	none	7	f. veg.	86.5	15.5	71.0	.207	.077	....	....	11.4	.37	.010	1.5	22.0	7.5	350	0	.10	Neg.
1910	12	Jan.-Dec.	none.	none.	8	f. veg. and unpl.	96.5	15.5	81.0	.230	.087	....	....	13.1	.34	.005	1.7	24 5	7.0	251	0	.09	Neg.
1911	12	Jan.-Dec.	none.	none	9	dist. veg. and unpl.	97.5	18.0	79.5	.210	.095	....	....	11.6	.37	.006	2.1	27.0	6.5	*39	0	.09	Neg.
1912	12	Jan.-Dec.	none.	none.	6	dist. veg.	95.5	12.5	83.0	.112	.069	....	....	12.4	.32	.005	1.5	26.0	6.0	31	0	.14	Neg. occasional v. low +
1912 Max	.....	.....	none.	v. sl.	13	v. decid. of micro-org.	126.0	14.5 17.0	111.5 111.5	.358	.098	....	....	20.6	.60	.014	2.2	37.5	12.0	320	0	.20	+
1912 Min.	.....	.....	none.	none.	2	v. f. veg.	62.5	10.0 9.0	52.5 52.5	.012	.044	....	....	6.3	.08	.000	1.0	14.5	3.5	0	0	.10	Neg.

V. sl.=very slight; v. f.=very faint; f.=faint; dist.=distinct; decid.=decided; v. decid.=very decided; veg.=vegetable; unpl.=unpleasant; micro-org.=micro-organism; neg.=negative; v. low.=very low. *Excluding one abnormal count.

East Providence Water Supply.

(Sample from tap in town.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Alum.	Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.							
1908	12	Jan.-Dec.	v. sl.	v. sl.	12	f. veg.	71 0	12.5	58.5	.058	.069	.064	.005	8.6	.29	.001	1.3	18.5	7.0	215	0	neg.	.28
1909	12	Jan.-Dec.	v. sl.	none. to v. sl.	14	f. veg.	87.5	15.0	72.5	.199	.072	.067	.005	11.5	.36	.003	1.4	22.0	8.0	660	0	neg.	.43
1910	12	Jan.-Dec.	sl. to decid.	v. sl.	23	f. veg.	98.0	17.0	81.0	.221	.085	.072	.013	13.0	.32	.004	1.6	24.5	7.0	285	0	neg.	.84
1911	12	Jan.-Dec.	sl.	v. sl.	20	dist. veg. and unpl.	104.0	20.5	83.5	.218	.086	.080	.006	11.9	.41	.006	2.0	27.5	7.0	*60	0	neg.	.75
1912	12	Jan.-Dec.	v. sl.	none. to v. sl.	14	f. to dist. veg.	95.5	13.0	82.5	.103	.071	.067	.004	12.5	.29	.003	1.5	25.5	8.5	59	0	neg.	.42
1912 Maximum			decid. iron.	v. sl. iron.	50	decid. veg. and earthy.	122.5	14.5 17.5	108.0 108.0	.318	.094	.086 .086	.008 .022	20.4	.55	.014	2.3	34.0	11.5	470	0	low +	1.80
1912 Minimum			none.	none.	5	f. veg.	63.0	10.0 9.5	53 0 53.0	.002	.044	.044	.000	7.0	.05	.000	.8	17.0	5.5	0	0	neg.	.06

V. sl.=very slight, sl.=slight; decid.=decided; v. f.=very faint; f.=faint; dist=distinct; veg.=vegetable; neg.=negative. *Excluding 1 abnormal count

Exeter Water Supply.

(Sample from the supply of the School for Feeble-Minded, being from a tap in the building.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.						
1909	12	Jan.-Dec.	v. sl.	none.	6	at first tarry; later none to v. f. earthy.	32.5	7.5	25.0	.010	.013	....	....	4.7	.08	.000	.3	8.0	8.0	* 4770	0	.....
1910	12	Jan.-Dec.	sl.	none.	12	none.	31.5	7.0	24.5	.006	.004	....	....	4.4	.04	.000	.1	5.5	7.5	93	0	42
1911	12	Jan.-Dec.	v. sl. to sl.	none to v. sl.	7	none.	33.0	8.5	24.5	.007	.007	....	....	4.5	.05	.000	.0	5.5	7.0	23	0	.32
1912	12	Jan.-Dec.	v. sl. to sl. iron.	none. to v. sl.	10	none.	31.5	6.0	25.5	.003	.002	....	....	4.5	.06	.000	.0	4.0	7.0	1	0	.47
1912 Maximum	..	.....	sl. iron.	sl. iron.	14	v. f. earthy.	34.0	7.0 8.0	27.0 28.5	.008	.008	....	....	5.3	.13	.000	.1	6.5	8.0	3	0	1.30
1912 Minimum	..	.....	v. sl.	none	6	none.	30.5	5.0 4.5	25.5 23.5	.000	.000	....	....	3.8	.02	.000	.0	1.5	6.0	0	0	.25

V. sl.=very slight; sl.=slight; v. f.=very faint. *Including early high counts; new system

Jamestown Water Supply.

(Sample from intake at pumping station, being water from reservoir and raw water applied to filters, before addition of chemicals.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	11	Jan.-Dec.	v. sl.	v. sl.	61	dist. veg. and of micro-org.	63.5	21.5	39.0	.037	.241	.204	.037	9.8	.10	.001	6.7	16.0	8.5	1,640	.....
1908	12	Jan.-Dec.	sl.	sl.	71	dist. veg. and of micro-org.	75.0	34.0	41.0	.056	.424	.272	.152	12.6	.15	.001	9.2	15 5	7.5	3,920	.....
1909	11	Jan.-Dec.	sl.	sl	67	dist. veg and of micro-org.	74.5	33.5	41.0	.012	.353	.261	.089	12.7	.18	.001	8.5	17.0	7.0	1,420	.....
1910	12	Jan.-Dec.	sl.	sl.	73	dist. veg. and of micro-org.	80.5	36.0	44.5	.056	.445	.331	.111	12.9	.13	.002	10.7	19.5	6.5	1,572	0 to +
1911	12	Jan.-Dec.	v. sl. to sl.	sl. to cons.	85	dist. to decid. veg. and of micro-org.	76.0	32.5	43.5	.051	.378	.328	.050	12.4	.09	.001	11.4	18.0	6.0	1,674	*0
1912	12	Jan.-Dec.	v. sl. to sl. micro-org. decid	sl. to cons. micro-org. v.cons.	76	dist. to decid. veg. and of micro-org.	71.0	21.5	46.5	.040	.403	.344	.059	11.8	.10	.001	9.3	15.5	8.0	2,321	0
1912 Max			micro-org.	micro-org.	118	v. decid. veg.	112.5	35.0	77.5	.072	.712	.668 .668	.044 .158	18.4	.37	.002	12.8	30.0	14.5	13,200	0
1912 Min			none.	none.	42	f. veg. and unpl.	56.0	20.0 19.5	36.0 31.5	.020	.294	.261 .254	.030 .008	8.7	.02	.000	6.2	6 5	3.5	24	0

V. sl.=very slight; sl.=slight; cons.=considerable; micro-org.=micro-organisms; decid.=decided; v. cons.=very considerable; f.=faint; dist.=distinct; v. decid.=very decided; veg.=vegetable; unpl.=unpleasant. *Occasional +.

During 1912, the water contained at practically all times large quantities of miscellaneous micro-organisms, including diatoms, synura, coelosphaerium, uroglena, dinobryon, glenodinium, etc., etc.

Jamestown Water Supply.

(Sample from outlet of filter.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c.c.	B. coli.	Iron.	Alum.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.							
1910	5	Aug.-Dec.	decid.	sl.	64	dist. veg. and of micro-org.	99.5	45.0	54.5	.094	587	.376	.211	14.2	.08	.003	11.1	21.0	3.5	6,590	0 to +	.75	Low +, to +
1911	12	Jan.-Dec.	none to v. sl.	none.	23	f. to dist. veg.	84.5	20.5	64.0	.043	.167	.165	.002	12.5	.10	.001	4.3	18.5	8.5	246	0	.11	Low +, occasional neg.
1912	12	Jan.-Dec.	none to v. sl.	none to v. sl.	12	f. to dist. veg. occasional aromatic.	76.5	12.0	64.5	.029	.145	.143	.002	12.2	.09	.001	2.9	16.5	7.0	87	0	.10	Neg. to +
1912 Max	...	.....	v. sl.	v. sl.	37	dist. veg.	128 5	18.5	110.0	.060	.258	.258 .258	.000 .012	19.2	.33	.004	5.3	30.0	9.5	365	0	.22	++++
1912 Min.	...	.....	none.	none.	3	v. f. veg.	52.5	9.5 7.0	43.0 43.0	.012	.080	.080	.000	8.4	.02	.000	1.3	8.0	2.5	1	0	.01	Neg.

V. sl.=very slight; sl.=slight; decid.=decided; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant; neg=negative.

During 1912, two samples showed the presence of a little amorphous matter and a few micro-organisms.

Jamestown Water Supply.

(Sample from a tap in the town.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Iron.	Alum.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.							
1907	12	Jan.-Dec.	v. sl.	sl.	58	dist. veg. and of micro org.	71.5	26.0	45.5	.031	.247	.189	.058	9.9	.13	.000	6.3	21.0	14.5	713	‡0	....	.....
1908	12	Jan.-Dec.	sl.	sl.	62	dist. veg. and of micro-org.	86.5	34.5	52.0	.052	.351	.226	.125	14.6	.31	.003	7.1	23.5	14.5	3390	0	....	.....
1909	11	Jan.-Dec.	sl.	sl.	58	dist. veg. and of micro-org.	91.5	37.0	54.5	.056	.300	.203	.097	14.2	.34	.003	6.6	28.5	20.5	834	0	....	.....
1910*	6	Jan.-Dec.	sl.	sl.	70	f. to dist. veg.	74.0	28.0	46.0	.022	.261	.201	.060	12.1	.23	.001	8.2	21.0	10.0	838	0 to +	....	.....
1910†	6	July-Dec.	sl.	sl.	75	dist. veg. and of micro-org.	102.0	10.0	62.0	.039	.519	.281	.235	13.1	.08	.000	9.0	29.5	11.5	1725	0 to +	1.01	Low +
1911	12	Jan.-Dec.	v. sl.	v. sl.	24	f. to dist. veg.	89.5	20.0	69.5	.012	.167	.160	.007	12.7	.10	.001	4.0	22.0	12.0	248	0	.35	§
1912	12	Jan.-Dec.	v. sl. iron.	v. sl. iron.	19	f. to dist. veg.	78.0	12.5	65.5	.026	.149	.141	.008	12.1	.11	.001	3.0	17.5	8.5	73	0	.38	Neg., occasional +
1912 Max.			sl. iron.	sl. iron.	55	decid. veg.	129.5	18.5	111.0	.062	.362	.311	.018	19.1	.10	.004	6.0	29.5	14.5	525	0	1.40	+ + +
1912 Min.			none.	none.	5	v. f. veg.	56.0	10.0 9.0	46.0 46.0	.001	.072	.072	.000	8.0	.03	.000	1.3	8.5	5.0	1	0	.01	Neg.

*While unfiltered. †While filtered. ‡To presumptive +. §v. low + to low +; 6 neg. V. sl.=very slight; sl.=slight; v. f.=very faint; f.=faint; dist.=distinct; decided.=decided; veg.=vegetable; micro-org.=micro-organisms; v. low.=very low; neg.=negative.

During 1912, four samples showed amorphous matter present.

Jamestown Water Supply.

(Sample from well at south station.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid.				As Nitrates.	As Nitrites.				
											Total.	In Solution.	In Suspension.							
1907	11	Jan.-Dec.	none.	v. sl.	2	none.	143.5	44.5	99.0	.016	.047	.042	.005	33.1	2.48	.001	.6	43.0	16.5	3,707
1908	12	Jan.-Dec.	none.	v. sl.	3	v. f. veg.	153.5	52.0	101.5	.017	.053	.041	.012	35.5	3.25	.001	.7	46.5	15.0	6,800
1909	11	Jan.-Dec.	none.	v. sl.	2	none.	175.5	65.5	110.0	.020	.034	.030	.004	42.2	4.00	.001	.4	53.5	14.0	1,640
1910	7	Jan.-July.	none.	none.	0	none.	208.0	72.5	135.5	.012	.032	.025	.007	57.6	4.54	.002	.3	61.0	11.5	1,140

V. sl.=very slight; v. f.=very faint; veg.=vegetable.

Note:—This supply not now used.

Kingston Water Supply.

(Sample from a tap in village.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor (Hot.)	Residue on Evaporation.			Ammonia.				Nitrogen.			Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition	Fixed	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.	Chlorine.	As Nitrates.	As Nitrites.						
1908	3	Apr.-Oct.	none.	none.	1	none.	197.0	80.5	116.5	.007	.025	.....	.....	19.1	8.40	.001	.3	61.5	36.0	3	0
1909	4	Feb.-Nov.	none.	none to v. sl.	3	none.	185.0	69.0	116.0	.012	.030	.....	.....	18.0	6.80	.001	.2	62.0	39.0	14	0
1910	4	Feb.-Nov	none to v. sl.	v. sl.	2	none.	141.0	48.5	92.5	.013	.030	.....	.....	15.2	4.90	.001	.2	46.0	29.5	15	0
1911	4	Feb.-Nov.	none to v. sl.	v. sl. to sl., iron.	4	none.	171.0	68.5	105.5	.006	.015	.....	.....	20.0	4.90	.001	.2	55.0	35.0	17	0
1912	1	Feb.-Nov.	none.	none to v. sl. iron.	2	none.	209.0	63.5	145.5	.003	.024	.....	.....	23.2	8.50	.000	.3	70.0	31.5	8	0
1912 Maximum			none.	v. sl. iron.	4	none.	228.0	79.0 79.0	149.0 154.0	.001	.034	.....	.....	23.8	11.00	.001	.4	81.5	55.5	20	0
1912 Minimum			none.	none	0	none.	193.0	58.0 50.5	135.0 135.0	.000	.014	.....	.....	22.8	5.20	.000	.1	57.0	20.5	1	0

V. sl.=very slight. This supply from an artesian well

Manville Water Supply.

(Sample from a tap supplied by the Manville Co. Supply.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	9	Jan.-Nov.	none.	v. sl.	45	dist. veg.	59.0	22.0	37.0	.015	.100	.094	.006	5.7	.54	.001	4.8	18.5	10 0	2205	+ to 0
1908	12	Jan.-Dec.	none.	v. sl.	30	f. veg.	62.5	22.0	40.5	.014	.071	.066	.005	7.0	.75	.001	3.1	19.0	11.0	3085	0 to +
1909	12	Jan.-Dec.	v. sl.	v. sl. to sl.	25	f. veg.	69.0	23.5	45.5	.024	.074	.069	.005	7.9	.86	.001	2.5	23.0	12.0	679	0 (occasional +)
1910	12	Jan.-Dec.	v. sl.	v. sl.	30	f. veg.	70.5	25.5	45.0	.036	.089	.075	.014	8.0	.62	.007	2.9	24.0	15.5	779	0 to +
1911	12	Jan.-Dec.	v. sl.	sl.	39	f. veg.	77.0	27.0	50.0	.015	.099	.091	.008	7.6	.84	.002	4.3	27.0	13.5	225	0 (occasional +)
1912	12	Jan.-Dec.	none to v. sl.	sl.	48	v. f. to f. veg.	69.5	21.5	48.0	.010	.104	.094	.010	7.9	.59	.001	4.4	20.5	11.5	264	0 (occasional +)
1912 Maximum	..	.....	sl.	v.cons. iron.	160	dist. veg.	98.5	21.0 31.0	77.5 77.5	.020	.250	.232 .232	.018 .048	14.0	1.10	.001	14.0	35.0	19.0	1200	+
1912 Minimum	..	.....	none.	v. sl.	10	none.	39.0	14.0 11.0	25.0 22.5	.000	.024	.024	.000	3.9	.12	.000	.3	9.5	5.0	10	0

V. sl.=very slight; sl.=slight; v. cons.=very considerable; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable.

During 1912 three samples showed the presence of amorphous matter.

Narragansett Pier Water Supply.

(Sample from the pumping station at Rocky Brook.)

(parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	12	Jan.-Dec.	v. sl.	v. sl.	79	dist. veg.	46.5	20.5	26.0	.020	.157	.133	.024	6.3	.05	.000	7.7	6.0	3.5	2,400
1908	12	Jan.-Dec.	v. sl. to sl.	v. sl.	76	dist. veg.	45.0	18.5	26.5	.017	.148	.124	.024	7.1	.08	.000	6.6	6.5	4.5	2,840
1909	12	Jan.-Dec.	v. sl. to none.	v. sl. to none.	77	f. to dist. veg.	48.0	22.0	26.0	.024	.144	.124	.020	7.4	.07	.000	7.5	8.0	4.0	788
1910	12	Jan.-Dec.	v. sl. to sl.	v. sl.	68	f. to dist. veg.	46.0	19.0	27.0	.019	.153	.134	.019	7.2	.06	.000	6.9	8.0	4.0	1,924
1911	12	Jan.-Dec.	v. sl. to sl.	v. sl.	85	dist. veg.	53.0	25.0	28.0	.011	.172	.157	.015	6.6	.05	.000	9.0	10.0	3.5	993
1912	12	Jan.-Dec.	sl.	v. sl. to sl.	84	dist. veg.	48.0	20.0	28.0	.019	.174	.150	.024	6.1	.04	.000	8.3	6.5	3.5	3,446
1912 Maximum			great.	sl.	124	decid. veg.	57.5	23.5 25.0	34.0 34.0	.034	.216	.142 .208	.074 .071	8.0	.10	.001	10.4	9.5	5.0	19,000
1912 Minimum			none.	none.	60	f. veg.	34.5	14 0	20.5	.008	.124	.112 .112	.012 .000	3.8	.00	.000	6.7	3.0	1 0	15

V. sl.=very slight; sl.=slight; f.=faint; dist.=distinct; decid.=decided; veg.=vegetable.

During 1912 this water contained practically at all times micro-organisms including diatoms, and at times dinobryon and anabaena, also amorphous matter.

Narragansett Pier Water Supply.

(Sample from tap in the town.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	v. sl.	v. sl.	70	dist. veg.	46.5	19.5	27.0	.013	.134	.120	.014	6.4	.06	.000	6.9	6.5	4.5	873	0 *
1908	12	Jan.-Dec.	v. sl.	v. sl.	71	dist. veg	44.0	18.5	25.5	.014	.130	.116	.014	7.0	.08	.000	6.2	6.0	4 0	730	0
1909	12	Jan.-Dec.	v. sl. to none.	none to v. sl.	69	f. to dist. veg.	46.5	20.0	26.5	.014	.120	.109	.011	7.4	.08	.000	6.7	7.5	4.0	535	0
1910	12	Jan.-Dec.	v. sl.	none to v. sl.	65	f. to dist. veg.	45.5	18.5	27.0	.012	.139	.126	.013	7.1	.06	.000	6.8	7.5	4.0	1,218	0
1911	12	Jan.-Dec.	v. sl.	none to v. sl.	80	dist. veg.	49.5	21.5	28.0	.010	.152	.140	.012	6.7	.05	.000	8.5	8.5	3.0	204	0
1912	12	Jan.-Dec.	v. sl.	v. sl.	73	dist. veg.	46.0	18.5	27.5	.010	.141	.129	.012	6.3	.05	.000	7.5	7.5	3.5	1,549	0
1912 Maximum			v. decid	cons.	98	decid. veg.	53.5	19.0 23.5	34.5 34.5	.018	.196	.186 .186	.010 .026	7.8	.12	.001	9.4	11.0	5.0	14, 50	+
1912 Minimum			none.	none.	53	f. veg.	32.5	14.0	18.5	.004	.096	.096	.000	4.7	.00	.000	6.5	3.0	1.0	20	0

V. sl.=very slight; v. decid.=very decided; cons.=considerable; f.=faint; dist.=distinct; decid.=decided; veg.=vegetable. *To presumptive +

During 1912 this water contained practically a all times micro-organisms including diatoms, and at times dinobryon and anabaena, also amorphous matter.

Narragansett Pier (Gladstone Spring).

(Sample from a tap supplied by the spring.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Appearance. Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Odor. (Hot.)	Residue on Evaporation. Total.	Residue on Evaporation. Loss on Ignition.	Residue on Evaporation. Fixed.	Ammonia. Free.	Ammonia. Albuminoid. Total.	Ammonia. Albuminoid. In Solution.	Ammonia. Albuminoid. In Suspension.	Chlorine.	Nitrogen. As Nitrates.	Nitrogen. As Nitrites.	Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
1907	3	June-Aug.	none.	none.	0	none.	73.5	20.0	53.5	.001	.003	....	....	14.2	.87	.000	2	22.5	11.5	23	0
1908	3	July-Sept.	none.	none.	1	none.	76.0	24.0	52.0	.001	.003	....	....	14.3	.78	.000	.0	20.0	11.0	223	0 *
1909	4	June-Sept.	none.	none.	0	none.	81.0	29.0	52.0	.007	.009	....	....	15.7	1.18	.000	.0	25.5	9.5	39	0
1910	4	June-Sept.	none.	none.	0	none.	80.0	23.5	56.5	.001	.004	....	....	16.0	.92	.000	.0	24.5	11.0	236	0
1911	5	July-Oct.	none.	none.	1	none.	87.0	26.5	60.5	.001	.006	....	....	16.9	1.02	.000	.1	25.5	11.5	§100	0
1912	4	June-Sept.	none.	none.	1	none.	98.5	29.5	69.0	.000	005	....	....	20.7	1.56	.002	.0	27.0	10.0	30	0
1912 Maximum	....	....	none.	sl. iron.	6	none.	101.0	34.0 34.0	70.0 73.5	.000	.008	....	....	22.6	1.75	.006	.1	30.0	10.5	77	0
1912 Minimum	....	....	none.	none.	0	none.	91.0	27.0	64.0	.000	.000	....	....	19.6	1.30	.000	.0	23.5	9.5	1	0

Sl.=slight. *One sample +. §Excluding two high counts.

Newport Water Supply.

(Sample from intake from south Easton's Pond, being the raw water applied to filters before addition of chemicals.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1910	6	May-Dec	sl., micro-org.§	cons., micro-org.§	46	dist. to decid. veg. & unpl. micro-org.	102.5	35.5	67.0	.090	.548	387	.161	18.9	.09	.002	6.4	29.0	18.5	1,439	†
1911	12	Jan.Dec.	sl., micro-org.	sl. to cons., micro-org.	36	dist. veg. and of micro-org.	103.5	34.5	69.0	035	.409	.301	.108	20.9	.24	.003	5.8	31.0	16.0	500	0
1912	12	Jan.-Dec.	sl., micro-org.	cons., micro-org.	35	dist. of micro-org.	90.5	27.0	63.5	.044	.467	.326	.141	16.2	.16	.005	5.7	26.5	17.0	699	0
1912 Maximum			v. decid micro-org-	*	43	decid. unpl. and of micro-org.	112.5	30.0 32.5	82.5 82.5	.072	.688	.328 .450	.360 .360	20.0	.40	.012	6.4	30.0	23.0	5,650	+
1912 Minimum			none.	v. sl.	27	v. f. veg.	74.0	23.5 22.0	50.5 50.5	.012	.318	.284 .232	.034 .026	12.2	.00	.001	5.0	21.0	11.0	23	0

V. sl.=very slight; sl.=slight; cons.=considerable; v. cons.=very considerable; v .f.=very faint; dist.=distinct; decid.=decided; v. decid.= very decided; veg. =vegetable; unpl.=unpleasant; micro-org.=micro-organisms. *v. cons., micro-org., also great many crustaceans. †0 (occasional +.) §Also crustaceans.

During 1912 this water at all times contained large quantities of miscellaneous micro-organisms including dinobryon, staurastrum, pediastrum, microcystis, diatoms, protozoa, etc., etc.

Newport Water Supply.

(Sample from tap in laboratory at pumping station, being the filtered water as pumped from the clear well.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot)	Residue on Evaporation.				Ammonia.				Nitrogen.					Bacteria per c. c.	B. coli.	Iron.	Alum.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	In Solution.	In Suspension.	Chlorine.	As Nitrates.	As Nitrites.	Oxygen Consumed.	Hardness.	Alkalinity.				
1910	8	May-Dec	none	none.	11	f. veg. to unpl.	99.5	30.5	69.0	.083	.227	.215	.012	19.9	.12	.001	3.0	31.5	13.0	2,428	0	.10	Neg., occasional low +
1911	12	Jan.-Dec.	v. sl. micro-org.	none to v. sl.§	16	dist. veg. and of micro-org.	102.5	28.5	74.0	.017	.232	.215	.017	21.1	.26	.000	3.6	33.5	12.0	503	0	.11	Low +
1912	12	Jan.-Dec.	none. to v. sl.	none to v. sl.	11	f. to dist. veg. micro-org.	86.5	22.5	64.0	.043	.212	.197	.015	16.7	.18	.000	3.0	27.5	9.5	441	0	.09	V. low + to low +
1912 Max.			sl. micro-org.	v. sl. micro-org.	21	deecid. of micro-org. like seaweed.	97.5	27.5 29.0	70.0 78.0	.082	.320	.262 .278	.058 .058	21.0	.42	.002	4.6	32.0	16.5	3,750	0	.15	+ + + +
1912 Min.			none.	none.	4	v. f. veg.	71.5	21.0 17.0	50.5 50.5	.022	.106	.106	.000	12.4	.00	.000	1.7	21.0	7.0	0	0	.02	Neg.

V. sl.=very slight; sl.=slight; v. f.=very faint; f.=faint; dist.=distinct; deecid.=decided; veg.=vegetable; micro-org.=micro-organisms; neg.=negative; v. low =very low. §Micro-organisms.

During 1912 this water showed the presence of a little amorphous matter and a few micro-organisms.

Newport Water Supply.

(Sample from a tap in the city.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Iron.	Alum.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.							
1907	12	Jan.-Dec.	v. sl.	sl.	38	dist. of micro-org. and veg.	89.5	30.0	59.5	.077	.327	.230	.097	16.7	.25	.004	4.5	25.5	18.0	640	0*		
1908	12	Jan.-Dec.	sl.	sl	30	dist. veg. and of micro-org.	85.0	29.0	56.0	.078	.272	.235	.037	18.4	.32	.003	4.3	26.0	16.0	1,603	0		
1909	12	Jan.-Dec.	v. sl. to sl.	v. sl. to sl.	28	dist. unpl. micro-org.	93.5	31.0	62.5	.090	.261	.230	.031	20.2	.23	.003	4.0	30.5	19.5	1,076	0		
†1910	4	Jan.-April.	sl. to decid micro-org.	sl. micro-org.	38	dist. unpl. micro-org.	94.5	32.0	62.5	.060	.283	.203	.080	20.3	.45	.003	4.3	25.5	13.0	1,603	0		
‡1910	8	May-Dec.	sl. micro-org.	v. sl. to sl.§	26	dist. to decid. veg. and unpl. micro-org.	95.5	32.0	63.5	.036	.330	.267	.063	20.1	.10	.001	4.2	29.0	15.5	2,427	0, one +	.31	Neg., one v. low +
1911	12	Jan.-Dec.	sl. micro-org.	sl. micro-org.	22	dist. veg. and of micro-org	108.5	33.0	75.5	.032	.294	.238	.056	22.0	.27	.001	4.1	33.5	13.5	332	0	.20	v. low +, occasional neg.
1912	12	Jan.-Dec.	none. to v. sl.	v. sl.	12	f. to dist. veg. micro-org.	87.0	21.0	66.0	.036	.195	.182	.013	16.8	.21	.001	2.8	27.5	10.0	378	0	.15	Low +
1912 Max.			v. sl. micro-org.	sl. micro-org.	25	dist. veg. and of micro-org.	97.5	25.0 30.0	72.5 80.0	.064	.292	.262 .262	.030 .046	22.2	.44	.004	4.3	32.5	17.0	2,850	0	.30	+++++
1912 Min.			none.	none.	4	f. veg.	69.0	17.5 16.0	51.5 51.5	.022	.132	.116 .116	.016 .000	12.6	.05	.000	1.8	21.0	6.0	1	0	.09	Neg.

V. sl.=very slight; sl=slight; micro-org.=micro-organisms; veg.=vegetable; unpl.=unpleasant; dist.=distinct; decid.=decided; f.=faint; v. low=very low; neg.=negative. *To presumptive +. †Before filtration. ‡After filtration. §Micro-organisms.

During 1912 eight of the samples showed the presence of amorphous matter and micro-organisms, including dinobryon, synura, diatoms, etc.

Newport Water Supply.

(Sample from tap in engineer's cottage at pumping station.)*

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Odor. (Hot.)	Residue on Evaporation. Total.	Loss on Ignition.	Ammonia. Albuminoid. Fixed.	Free.	Total.	In Solution.	In Suspension.	Chlorine.	Nitrogen. As Nitrates.	As Nitrites.	Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
1907	12	Jan.-Dec.	v. sl.	v. sl.	33	dist. veg. and of micro-org.	83.0	29.5	53.5	.141	.316	.254	.062	14.7	.17	.004	4.5	24.0	17.0	637
1908	12	Jan.-Dec.	v. sl.	v. sl.	28	dist. veg. and of micro-org.	84.5	29.0	55.5	.069	.259	.224	.035	18.7	.31	.003	3.9	26.0	15.5	1,037
1909	12	Jan.-Dec.	v. sl. to sl.	v. sl. to sl.	26	f. unpl. micro-org.	88.5	29.5	59.0	.076	.254	.221	.033	18.4	.22	.001	3.8	30.0	17.5	958
1910	4	Jan.-April	sl. to decid. micro-org.	sl. micro-org.	31	dist. unpl. micro-org.	95.5	31.0	61.5	.097	.273	.210	.063	22.0	.30	.002	4.4	28.0	13.0	880

V. sl.=very slight; sl.=slight; decid.=decided; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant; micro-org.=micro-organisms.

This sample discontinued after filter plant was installed. *1909 and 1910 samples from tap in fire-room.

Pascoag Water Company Supply.

(Sample from tap in Harrisville, supplied from Harrisville Wells.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.						
1912	5	Aug.-Dec.	none.	sl. iron.	31	v. f. veg.	41.0	13.0	28.0	.06	.060	.053	.007	3.6	.06	.000	2.9	8.5	9.0	348	0	.52
1912 Maximum			decid. iron.	v. cons. iron.	Turbid about 40	dist. veg	49.0	18.5 18.5	30.5 32.0	.012	.064	.064 .064	.000 .022	4.0	.10	.000	3.7	9.5	10.5	510	+	1.60
1912 Minimum			none.	none.	23	none.	37.5	12.0 9.5	25.5 25.5	.000	.054	.054 .048	.000 .000	3.3	.02	.000	2.4	8.0	7.0	125	0	.11

Sl.=slight; decid.=decided; v. cons.=very considerable; v. f.=very faint; dist.=distinct; veg.=vegetable.

Pascoag Water Company Supply.

(Sample from tap in Pascoag.)

(Parts per 1,000,000)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	none.	none.	7	none.	42.5	10.0	32.5	.005	.014	.....	.....	2.9	.03	.000	.7	11.5	14.5	149	0 to +
1908	12	Jan.-Dec.	none.	none.	6	none to v. f. earthy.	47.0	11.0	36.0	.003	.012	.....	.....	3.4	.01	.000	.5	13.5	19.0	203	0
1909	12	Jan.-Dec.	none.	none. to v. sl.	5	none to v. f. earthy.	62.0	14.0	48.0	.005	.012	.....	.....	4.3	.07	.000	.3	21.5	25.5	121	0
1910	12	Jan.-Dec.	v. sl.	none. to v. sl.	8	none to v. f. earthy.	53.0	12.0	41.0	.005	.031	.....	.....	4.0	.11	.000	.7	17.5	18.5	131	0
1911	12	Jan.-Dec.	none.	none.	2	none.	71.0	15.0	56.0	.006	.008	.....	.....	5.6	.27	.000	.3	27.5	19.0	29	0
1912	12	Jan.-Dec.	none.	none. to v. sl.	8	none to v. f. veg.	55.5	10.0	45.5	.002	.019	.....	.....	4.4	.18	.000	.7	19.5	20.0	590	0, two +
1912 Maximum			sl. clay	cons. clay	30	dist. veg.	104.0	9.0 14.5	95.0 95.0	.018	.062	.....	.....	6.9	.50	.001	3.0	36.5	40.0	6,350	+
1912 Minimum			none.	none.	2	none.	23.5	5.5 5.0	18.0 18.0	.000	.001	.....	.....	2.2	.01	.000	.0	1.5	3.5	11	0

V. sl.=very slight; sl.=slight; cons.=considerable; v. f.=very faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant.

Pascoag Water Company Supply.

(Sample from deep wells at Pascoag.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	4	July-Oct.	none.	v. sl.	3	none.	93.0	17.5	75.5	.003	.009	....	....	5.4	.05	.000	.1	32.0	43.0	180	....
1908	6	July-Dec.	v. sl.	v. sl.	8	v. f. earthy.	84.0	16.0	68.0	.003	.007	....	....	5.0	.06	.000	.2	27.5	35.5	64	....
1909	8	Jan.-Feb. July-Dec.	none.	v. sl.	3	none.	78.0	17.0	61.0	.005	.005	....	....	5.3	.09	.000	.0	27.5	35.0	80	....
1910	8	Jan. May-Sept. Nov.-Dec.	none. to v. sl.	v. sl.	5	none.	73.0	16.0	57.0	.004	.011	....	....	5.1	.12	.000	.2	25.0	28.5	111	0
1911	10	Jan.-April June-Nov.	v. sl.	none. to v. sl.	1	none.	84.0	17.5	66.5	.004	.011	....	....	6.1	.18	.000	.2	32.5	37.0	38	0

V. sl.=very slight; v. f.=very faint.

This sample discontinued as a separate sample in 1912.

Pawtucket Water Supply.

(Sample from pumping station 3, as pumped from Happy Hollow Pond.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	12	Jan.-Dec.	v. sl.	none.	29	f. veg.	39.0	13.0	26.0	.012	.103	.096	.007	3.0	.05	.001	3.1	10.0	10.0	215
1908	12	Jan.-Dec.	v. sl.	none.	23	f. veg.	36.0	13.0	23.0	.014	.091	.084	.007	3.2	.09	.001	2.6	11.0	9.5	193
1909	12	Jan.-Dec.	v. sl.	none.	26	f. veg.	37.5	12.5	25.0	.028	.103	.098	.005	3.7	.09	.001	2.7	11.5	9.0	248
1910	12	Jan.-Dec.	v. sl. +	none to v. sl.	27	f. to dist. veg.	39.5	13.0	26.5	.024	.116	.106	.010	3.8	.07	.001	3.0	13.5	8.5	457
1911	12	Jan.-Dec.	v. sl. to sl.	v. sl. to sl.	30	dist. veg.	46.0	17.0	29.0	.028	.134	123	.011	4.0	.05	.001	4.0	15.5	8.5	443
1912	12	Jan.-Dec.	v. sl.	v. sl. to sl.	29	dist. veg.	41.5	12.0	29.5	.020	.119	.110	.009	4.1	.08	.001	3.2	13.5	10.0	391
1912 Maximum			decid.	sl.	48	decid. veg. and of micro-org.	45.5	10.0 14.0	35.5 35.5	.038	.162	.142 .142	.020 .022	4.7	.17	.002	5.3	15.5	11.0	2,500
1912 Minimum			none.	v. sl.	19	dist. veg.	36.5	11.0 8.5	25.5 25.0	.004	.078	.078	.000	3.6	.00	.000	2.1	9.5	5.5	1

During 1912 this water at practically all times contained amorphous matter; also micro-organisms, including diatoms, dinobryon, synura, inclosira, etc.

V. sl.=very slight; sl.=slight; decid.=decided; f.=faint; dist.=distinct; veg.=vegetable; micro-org.=micro-organisms.

Pawtucket Water Supply.

(Sample from tap in the office of the city engineer.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	v. sl.	v. sl.	29	dist. veg.	39.0	13.0	26.0	.012	.101	.096	.005	3.2	.05	.001	3.0	10.5	10.0	185	0
1908	12	Jan.-Dec.	v. sl.	v. sl.	25	dist. veg.	37.0	13.0	24.0	.011	.096	.088	.008	3.4	.09	.000	2.5	11.0	9.5	153	0
1909	12	Jan.-Dec.	v. sl.	none. to v. sl.	27	f. veg.	37.5	12.5	25.0	.019	.102	.095	.007	3.7	.09	.000	2.7	11.5	9.0	456	0
1910	12	Jan.-Dec.	v. sl.	v. sl.	28	f. to dist. veg.	40.5	13.0	27.5	.014	.119	.103	.016	3.7	.07	.001	3.0	14.0	8.5	839	0
1911	12	Jan.-Dec.	sl.	sl.	30	dist. veg.	45.5	16.5	29.0	.011	.127	.114	.013	3.9	.06	.001	3.8	14.5	8.5	356	0
1912	12	Jan.-Dec.	v. sl.	v. sl.	28	dist. veg.	41.5	12.5	29.0	.011	.108	.101	.007	4.2	.09	.001	3.1	13.0	9.5	*6,948	0
1912 Maximum			sl.	sl.	48	decid. veg. and earthy.	45.5	12.5 16.0	33.0 34.0	.020	.144	.130 .130	.014 .030	5.0	.15	.002	5.4	18.0	14.0	62,300	0
1912 Minimum			none.	none.	20	f. veg.	34.5	11.0 9.5	23.5 23.5	.004	.082	.082 .078	.000 .000	3.2	.00	.000	2.0	8.0	5.0	2	0

V. sl.=very slight; sl.=slight; f.=faint; dist.=distinct; decid.=decided; veg.=vegetable; micro-org.=micro-organisms. *3 high counts.

During 1912 this sample at all times contained amorphous matter; also micro-organisms, including diatoms, dinobryon, protozoa, etc.

Pawtuxet Valley Water Supply.

(Sample from tap supplied by Pawtuxet Valley Water Company supply.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance			Odor. (Hot.)	Residue on Evaporation.			Ammonia				Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.	Chlorine.	As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	v. sl.	v. sl.	25	f. to dist. veg.	33.0	11.5	21.5	.021	.116	.109	.007	3.0	.07	.001	2.5	7.0	8.5	513	0 to +
1908	12	Jan.-Dec.	v. sl.	v. sl.	21	dist. veg.	32.0	12.5	19.5	.012	.116	.104	.012	3.5	.06	.000	2.6	6.5	7.0	250	0
1909	12	Jan.-Dec.	v. sl.	none. to v. sl.	21	f. veg.	33.5	13.0	20.5	.021	.120	.110	.010	4.0	.07	.000	2.3	7.5	7.0	220	0
1910	12	Jan.-Dec.	v. sl.	v. sl.	21	f. veg. and unpl.	36.0	13 0	23.0	.011	.126	.110	.016	4.3	.07	.000	2.2	8.5	7 5	100	0
1911	12	Jan.-Dec.	v. sl.	v sl. to. sl.	18	f. veg. and unpl.	35.5	11.5	21.0	.009	.115	104	.011	4 4	.06	.000	2.3	9.0	7.5	52	0
1912	12	Jan.-Dec.	v. sl.	v. sl.	21	f. to dist. veg.	33.5	11.0	22.5	.019	.135	.117	.018	3 6	.06	.001	2.5	7.0	6.5	235	0
1912 Maximum			decid.	cons.	28	dist. fishy; micro-org.	39.0	13 0 11.5	26.0 26.0	.070	.160	.132 .112	028 .032	4.8	.10	.003	3.5	9.5	9 5	1640	0
1912 Minimum			none.	none.	15	v. f unpl.	29 5	11.0 9 0	18.5 18 5	.001	101	092 088	.012 .000	2 9	.01	.000	2.0	3 0	3.5	1	0

V. sl.=very slight; sl.=slight; cons.=considerable; decid=decided; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant.

During 1912 this sample at practically all times showed the presence of amorphous matter; also micro-organisms, including diatoms, dinobryon, glenodinium, etc.

Pawtuxet Valley Water Supply.

(Sample from tap supplied by Warwick and Coventry Water Company supply.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	none.	v. sl.	9	v. f. veg. to earthy.	20.0	6.0	14.0	.009	.050	.049	.001	3.1	.02	.000	.6	3.5	4.5	200	0
1908	12	Jan.-Dec.	none.	none to v. sl.	13	f. unpl.	19.5	6.0	13.5	.005	.044	.041	.003	3.3	.01	.000	.6	1.5	3.0	160	0
1909	12	Jan.-Dec.	none to v. sl.	none.	15	v. f. veg and unpl.	20.0	6.5	13.5	.014	.052	.045	.007	3.6	.03	.000	.5	1.0	2.0	51	0
1910	12	Jan.-Dec.	none to v. sl.	none.	10	v. f. veg. and unpl., and tarry.	20.5	6.5	14.0	.008	.051	.047	.004	4.0	.03	.000	.5	1.5	2.0	44	0
1911	12	Jan.-Dec.	v. sl. to none.	none.	11	v. f. veg. to tarry.	20.0	6.5	13.5	.006	.045	.043	.002	4.0	.03	.000	.6	4.0	2.0	14	0
1912	12	Jan.-Dec.	none.	none.	6	v. f. veg., marl and tarry.	19.0	5.0	14.0	.003	.049	.048	.001	3.9	.03	.000	.6	2.0	2.0	15	0
1912 Maximum			none.	v. sl.	14	dist. unpl.	21.5	6.0 7.0	15.5 15.5	.008	.064	.060 .060	.004 .006	4.7	.05	.000	.8	5.0	4.0	105	0
1912 Minimum			none.	none.	3	none.	17.5	3.5 2.5	14.0 12.0	.000	.038	.038	.000	3.4	.00	.000	.4	0.0	1.5	0	0

V. sl.=very slight; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant.

Pawtuxet Valley Water Supply.

(Sample from tap supplied by Knight's Fountain supply.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed	Hardness.	Alkalinity	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	none.	none.	0	none.	62.5	24.5	38.0	.001	.012	....	....	7.7	2.08	.000	.1	19.5	4.5	95	0
1908	12	Jan.-Dec.	none.	none.	0	none.	57.5	21.5	36.0	.001	.012	....	....	7.3	2.00	.000	.2	18.0	4.0	150	0
1909	9	Jan.-Sept.	none.	none.	0	none.	57.5	21.5	36.0	.008	.009	....	....	7.3	1.83	.000	.1	18.5	4.0	158	0
1910	7	Jan-July.	none.	none.	0	none.	59.0	22.5	36.5	.009	.013	....	....	8.6	1.96	.000	.1	17.5	3 0	166	0
1911	12	Jan.-Dec.	none.	none.	0	none.	77.5	33.0	44.5	.003	.008	....	....	10.5	2.68	.000	.1	23.0	3 0	50	0
1912	10	Jan.-Oct.	none.	none.	0	none.	69.0	24.5	44.5	.004	.013	....	....	8.6	2.45	.000	.1	21.5	3 5	115	0
1912 Maximum			none.	sl. iron.	0	v. f. veg.	79.5	28.0 33.0	51.5 51.5	.010	.024	....	....	10.8	3.70	.000	.3	26.0	5.5	395	+
1912 Minimum			none.	none.	0	none.	55.0	16.0 14.5	39.0 39 0	.000	.006	....	....	6 9	1.40	.000	.0	15.5	2.0	1	0

V. sl.=very slight; sl.=slight; v. f.=very faint; veg.=vegetable.

Providence Water Supply.

(Sample from the south branch of the Pawtuxet River at Washington.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.					Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.	Chlorine.	As Nitrates.	As Nitrites.				
1907	24	Jan.-Dec.	v. sl.	v. sl. to sl	53	dist. veg.	37.0	14.5	22.5	.022	.136	.124	.012	2.8	.02	.000	5.9	3.0	6.5	395
1908	24	Jan.-Dec.	v. sl.	v. sl. to sl.	47	dist. veg.	37.5	15.0	22 5	.016	.130	.117	.013	3.2	.01	.001	5.2	3.0	7.5	665
1909	24	Jan.-Dec.	v. sl.	v. sl. to sl.	45	dist. to decid. veg.	42.0	15.0	27.0	.025	.133	.122	.011	3.7	.03	.001	5.0	3.0	8.0	738
1910	16	Jan.-Aug.	v. sl.	v. sl.	46	dist. veg.	41.5	16.0	25.5	.013	.151	.134	.017	4.0	.03	.000	5.4	2.5	7.5	968

V. sl.=very slight; sl.=slight; dist.=distinct; decid.=decided; veg.=vegetable.

Sampling at this point discontinued in August, 1910.

Providence Water Supply.

(Sample from the north branch of the Pawtuxet River at Hope.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid.				As Nitrates.	As Nitrites.				
											Total.	In Solution.	In Suspension.							
1907	24	Jan.-Dec.	none. to v. sl.	v. sl.	41	dist. veg.	31.5	12.5	19.0	.013	.120	.109	.011	2.6	.03	.000	4.9	4.5	4.0	451
1908	24	Jan.-Dec.	v. sl.	v. sl.	36	dist. veg.	31.0	13.0	18.0	.009	.120	.102	.018	2.8	.03	.000	4.3	4.0	4.5	550
1909	24	Jan.-Dec.	v. sl.	v. sl. to sl.	35	dist. veg.	32.0	12.5	19.5	.020	.118	.106	.012	3.2	.04	.000	4.4	6.0	4.5	670
1910	16	Jan.-Aug.	v. sl.	v. sl.	39	f. to dist. veg.	33.5	14.0	19.5	.014	.130	.120	.010	3.4	.05	.000	4.7	4.5	4.5	460

V. sl.=very slight; sl.=slight; f.=faint; dist.=distinct; veg.=vegetable.

Sampling at this point discontinued in August, 1910.

Providence Water Supply.

(Sample from the Pawtuxet River at Pettaconset, being from the intake to the filter beds.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.				Ammonia.			Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	24	Jan.-Dec.	sl.	cons. to sl.	49	dist. veg. to unpl.	49.5	17.0	32.5	.015	.175	.139	.036	4.0	.07	.002	6.2	8.5	6.5	1,870	+
1908	24	Jan.-Dec.	sl.	cons.	43	dist. veg. to unpl.	52.5	17.5	35.0	.012	.174	.136	.038	4.6	.12	.003	5.4	9.5	7.5	2,150	+
1909	24	Jan.-Dec.	sl.	cons. to sl.	46	dist. veg. to unpl.	62.5	20.5	42.0	.018	.205	.148	.057	5.6	.11	.004	5.8	13.5	9.5	3,750	+
1910	24	Jan.-Dec.	sl.	sl.	48	dist. veg. to unpl.	65.5	23.0	42.5	.019	.239	.193	.046	6.0	.11	.006	6.9	14.0	12.5	3,227	+
1911	24	Jan.-Dec.	sl.	sl. to cons.	49	decid. veg. to unpl.	64.0	22.0	42.0	.023	.218	.178	.040	5.6	.11	.005	6.7	16.0	9.5	2,150	+ to 0
1912	24	Jan.-Dec.	v. sl. to sl.	sl.	49	dist to decid. veg.	58.5	16.5	42.0	.025	.203	.162	.041	5.8	.14	.005	6.2	13.0	10.0	1,925	+ to 0
1912 Maximum			v. decid.	v. cons.	67	v. decid. veg.	83.5	15.0 21.5	68.5 68.5	.072	.306	.164 .230	.142 .142	8.7	.26	.018	8.7	20.0	19.0	12,600	+
1912 Minimum			none.	v. sl.	35	f. veg.	35.0	12.5 11.5	22.5 21.0	.002	.128	.104 .092	.024 .010	2.5	.02	.001	4.1	3.0	4.0	1	0

V. sl.=very slight; sl.=slight; cons.=considerable; v. cons.=very considerable; f.=faint; dist.=distinct; decid.=decided: v. decid.=very decided; unpl.=unpleasant; veg.=vegetable.

During 1912, at practically all times, this water contained considerable amounts of amorphous matter; also considerable quantities of miscellaneous microorganisms, including diatoms, protozoa, dinobryon, melosira, synura, etc.

Providence Water Supply.

(Sample from the basin at Pettaconset, being water from all filters as pumped to Sockanosset Reservoir.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1910	8	Sept.-Dec.	none	none.	32	f. veg.	70.5	18.5	52.0	.029	.130	.124	.006	7.1	.07	.001	4.3	19.5	13.5	229	0, one +
1911	24	Jan.-Dec.	none.	none. to v. sl.	32	dist. veg.	55.5	16.0	39.0	.031	.107	.101	.003	5.7	.11	.001	4.1	15.5	9.5	*212	0, (three +
1912	21	Jan.-Dec.	none.	v. sl to none.	29	dist. veg.	52.0	11.5	10.5	.020	.100	.096	.004	5.9	.13	001	3.7	13.5	10.0	47	0, two +
1912 Maximum			none.	v. sl.	42	decid. veg	79.5	10.5 16.0	69.0 69.0	.066	.136	.118 .132	.018 .018	9.0	.24	.010	5.2	19.5	17.5	445	+
1912 Minimum			none.	none.	20	f. veg.	32.0	11.0 9.0	21.0 21.0	.002	.066	.066	.000	3.2	.01	.000	2.5	6.5	4.0	1	0

V. sl.=very slight; f.=faint; dist.=distinct; decid.=decided; veg.=vegetable.

*Eliminating one high count average=74.

During 1912 about half of the samples showed the presence of a little amorphous matter and at times a few micro-organisms, principally diatoms.

This sampling point was first established in September, 1910.

Providence Water Supply.

Examinations for Color and Bacteria per c. c. of Samples directly from Outlets of Filter Beds at Pettaconset.

Date.	No. of Beds.	Average. Color.	Average. Bacteria.	
Mar 27	9	34	4	
June 12	8	33	6	
Oct. 23	9	27	6	
Dec. 11	9	37	4	
Average of quarterly averages		33	5	
On above dates, raw		52	1065	% removal=color, 36.5%; bacteria, 99.5%

Note:—Comparing figures for color and bacteria obtained on raw water with 24 bi-monthly samples from filtered water basin, the following is shown:

Raw	49	1925	% removal color, 40.1%
Basin	29	47	% removal bacteria, 97 6%

Providence Water Supply.

(Sample from tap in the laboratory at the State House, Providence.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.				Ammonia.			Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	24	Jan.-Dec.	none to v. sl.	none. to v. sl	29	dist. veg.	13.0	13.0	30.0	.011	.081	.077	.001	4.1	.09	.000	3.4	9 5	8.0	*56	0†
1908	24	Jan.-Dec.	none.	v. sl	24	dist. veg.	11.0	13.5	30.5	.007	.075	.068	.007	4.6	.14	.000	2.9	9 5	8.5	65	0
1909	24	Jan.-Dec.	none.	none.	21	f. to dist. veg.	51.0	14.0	40.0	.012	.080	.076	.001	5.7	.12	.000	2.8	11.5	11.0	62	0
1910	24	Jan.-Dec.	none.	none. to v. sl	28	f. to dist. veg.	56.0	16.0	40.0	.012	.095	.092	.003	6.3	.12	.000	3.5	11 0	11.5	85	0
1911	24	Jan.-Dec.	none.	none. to v. sl	30	f. to dist. veg.	54.5	15.5	39.0	.010	.091	089	.002	5.8	.11	.000	3.9	16.0	10 5	44	0
1912	24	Jan.-Dec.	none.	none. to v. sl.	29	dist. veg.	51.5	11.5	40.0	.007	.088	086	.002	5.9	.12	.000	3.5	13 5	11 0	42	0
1912 Maximum			none.	sl.	40	decid. veg.	73.5	7.5 16.5	66.0 66.0	.020	.120	.120 .120	.000 .016	9.0	.21	.000	5.1	18.0	18 5	425	0
1912 Minimum			none.	none.	22	v. f. veg.	35 0	11.5 7.5	23.5 22.5	.002	.060	.060	.000	3.5	.02	.000	2.6	7 0	5 0	1	0

V. sl = very slight; sl. = slight; v. f. = very faint, f. = faint; dist. = distinct; decid. = decided.

*Excluding result influenced by opening river gate; including this = 127. †Excluding two positives evidently due to opening river gate.

During 1912 about half of the samples showed the presence of a little amorphous matter, and two of the samples showed the presence of diatoms and protozoa.

Shawomet Water Company Supply.

(Sample from a tap supplied by the Conimicut well service.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid.				As Nitrates.	As Nitrites.					B. coli.
											Total.	In Solution.	In Suspension.								
1909	5	Sept.-Dec.	none to v. sl.	none.	2	v. f. unpl.	101.5	21.5	80.0	.004	.010	....	....	5.8	01	.000	.1	16.5	57.0	205	0
1910	13	Jan.-Dec.	none.	none.	1	none.	96.5	18.5	78.0	.006	.008	....	....	5.8	.02	.000	.0	43.0	55.0	34	0
1911	12	Jan.-Dec.	none.	none.	0	none.	95.0	19.0	76.0	.006	.004	....	....	6.0	.02	.000	.0	43.5	52.0	11	0
1912	12	Jan.-Dec.	none.	none.	0	none.	95.0	11.5	83.5	.004	.005	....	....	6.7	.02	.000	.0	44.5	50.5	3	0
1912 Maximum			none.	v. sl.	2	none.	97.0	8.5 18.0	88.5 88.5	.008	.016	....	....	7.1	.06	.000	.0	48.5	51.5	16	0
1912 Minimum			none.	none.	0	none.	91.5	10.0 8.5	81.5 75.0	.000	.000	....	....	5.8	.00	.000	.0	41.5	50.0	0	0

V. sl.=very slight; v. f.=very faint; unpl.=unpleasant.

This sample was first taken in September, 1909.

Shawomet Water Company Supply.

(Sample from a tap supplied by the Shawomet well service.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.						
1909	7	April-Oct.	v. sl.	none.	8	none.	143.0	36.0	107.0	.027	.009	....	....	36.4	.02	.000	.1	50.5	47.5	115	0	.41
1910	6	May-Oct	sl.	v. sl.	10	none.	146.0	32.0	114.0	.031	.007	....	....	36.7	.03	.000	.1	52.5	49.5	9	0	.57
1911	6	May-Oct.	v. sl. iron.	v. sl. iron.	8	none.	146.0	35.0	111.0	.043	.002	....	....	35.7	.02	.000	.2	54.5	50.0	4	0	.43
1912	7	April-Oct.	none.	none.	4	none.	144.5	17.0	127.5	.042	.004	....	....	36.8	.02	*.004	.1	53.0	49.5	9	0	.25
1912 Maximum			v. sl.	v. sl.	8	none.	150.5	22.5 22.5	128.0 137.5	.054	.012	....	....	38.4	.05	.030	.1	54.5	51.5	33	0	.40
1912 Minimum			none.	none.	3	none.	136.0	15.0 11.5	121.0 121.0	.006	.000	....	....	34.8	.00	.000	.0	50.0	49.0	0	0	11

V. sl.=very slight; sl.=slight.

*All .000 but one determination.

This sample was first taken in April, 1909.

State Sanatorium Supply.

(Sample from a tap in the Sanatorium.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	3	May-Nov.	none.	v. sl.	17	v. f. veg.	22.5	8.5	14.0	.010	.063	.062	.001	1.7	.01	.000	1.7	5.0	4.5	44	0
1908	5	Jan.-Oct.	v. sl.	v. sl.	21	f. veg.	23.5	8.5	14.5	.009	.063	.054	.009	1.8	.01	.000	2.2	4.0	4.0	36	0
1909	4	Jan.-Oct.	none.	none.	15	f. veg.	22.0	6.5	15.5	.013	.068	.061	.007	2.0	.00	.000	1.7	4.5	2.5	11	0
1910	4	Jan.-Oct.	v. sl.	sl.	24	v. f. veg.	24.5	7.5	17.0	.014	.074	.069	.005	2.1	.02	.000	1.7	4.5	4.5	35	0
1911	4	Feb.-Nov.	none.	none. to v. sl.	10	v. f. veg.	22.0	8.0	14.0	.009	.073	.070	.003	2.1	.02	.000	1.7	3.0	2.0	130	0
1912	4	Feb.-Nov.	none. to v. sl.	v. sl.	12	f. veg.	22.0	7.5	14.5	.007	.069	.064	.005	2.2	.03	.000	1.7	3.0	3.5	6	0
1913 Maximum	..	.....	v. sl.	sl.	13	dist. veg.	23.5	7.5	16.0	.010	.074	.064 .072	.010 .010	2.4	.05	.000	2.1	5.0	6.5	15	0
1913 Minimum	..	.....	none.	none.	9	f. veg.	20.5	7.5 6.5	13.0 13.0	.002	.062	.054 .054	.008 .000	2.0	.00	.000	1.2	1.5	2.0	1	0

V. sl.=very slight; sl.=slight; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable.

During 1912, two of the samples showed the presence of considerable amounts of asterionella.

West Barrington Water Supply.

(Sample from a tap supplied by the Drownville Water Company supply.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.	Iron.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.						
1908	11	Jan.-Dec.	sl.	cons. iron.	63	f. veg.	69.5	24.0	45.5	.023	.112	.087	.025	8.6	.21	.001	5.4	22.0	13.0	325	0 to +	....
1909	8	Jan.-Aug.	v. sl.	sl. iron	39	f. veg.	71.5	22.0	49 5	.028	.110	.091	.019	9.6	.31	.001	4 0	26.0	15.0	598	0, one +	.59
*1909	1	Sept.-Dec.	none.	sl. to cons. iron.	5	none.	60.0	20.5	39.5	.008	.021	.021	.003	8.8	.54	.000	.4	22.5	12.5	81	0	.29
*1910	11	Jan.-Dec.	v. sl. iron.	v. sl. to sl. iron.	15	none to v f. veg. and earthy.	55.5	16.5	39.0	.012	.010	.038	.002	8.1	.42	.000	1.1	19.5	9.5	126	0	.47
*1911	12	Jan.-Dec.	sl. iron.	sl. iron.	21	v. f. veg.	63.5	20.5	43.0	.011	.058	.051	.001	9.5	.25	.000	2.2	22.5	10.5	536	0, one +	.63
*1912	12	Jan.-Dec.	sl. iron.	sl. iron.	28	v. f to f. veg.	61.5	17.0	44.5	015	.059	.055	.001	9.1	.27	001	2.2	21.0	10 5	72	0, two +	.93
1912 Maximum			decid. iron.	heavy. iron.	50	f veg.	89.5	25.0 25.0	61.5 65.5	066	.114	.098 .100	.016 .016	15.2	.43	.002	3.3	29.5	14.5	360	+	2.40
1912 Minimum			v. sl.	none.	13	v. f. veg.	13 0	11.0 10 0	32 0 32 0	.001	.028	.028	.000	6.9	.11	.000	.7	16.5	7.5	1 0		.22

V. sl.=very slight; sl.=slight; cons.=considerable; decid.=decided; v. f.=very faint; f.=faint; veg.=vegetable. *After new well

This supply from wells. These wells are drawn from in varying combinations. In September, 1909, a new well was dug. Began to examine this supply in 1908.

Westerly Water Supply.

(Sample from a drinking fountain in the town.)

(Parts per 1,000,000)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	none.	none.	0	none.	51.0	13.0	38.0	.003	.008	....	....	5.4	.54	.000	.1	18.0	16.5	20	0
1908	12	Jan.-Dec.	none.	none.	0	none.	49.5	13.5	36.0	.005	.011	....	....	5.7	.52	.000	.1	18.0	16.0	19	0
1909	12	Jan.-Dec.	none.	none.	0	none.	51.5	13.5	38.0	.005	.015	....	....	5.7	.53	.000	.1	19.5	15.5	66	0
1910	12	Jan.-Dec.	none.	none.	0	none.	51.5	14.0	37.5	.005	.011	....	....	5.9	.54	.000	.0	20.0	15.5	10	0
1911	12	Jan.-Dec.	none.	none.	0	none.	52.5	15.0	37.5	.004	.007	....	....	6.0	.51	.000	.0	20.0	16 0	33	0
1912	12	Jan.-Dec.	none.	none.	0	none.	54.0	12.0	42.0	.001	.009	....	....	6.1	.58	.000	.0	18.5	16.0	2	0
1912 Maximum	....	....	none.	v. sl.	1	none.	57.5	13.0 15.5	44.5 46.5	.004	.018	....	....	6.6	.80	.000	.1	22.0	18.0	7	0
1912 Minimum	....	....	none.	none.	0	none.	50.0	10.5 8.5	39.5 38.5	.000	.002	....	....	5.8	.50	.000	.0	15.5	14.5	0	0

V. sl.=very slight.

During 1912 three abnormal samples for bacteriological examination were obtained, due to work on the mains, and are eliminated in the average for bacteria.

Woonsocket Water Supply.

(Sample from the pumping station.)

(Parts per 1,000,000).

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	12	Jan.-Dec.	v. sl.	v. sl.	48	dist. veg.	34.0	15.0	19.0	.023	.154	.137	.017	2.7	.04	.000	5.2	5.0	5 0	444
1908	12	Jan.-Dec.	v. sl.	sl.	51	dist. veg.	37.0	17.0	20.0	.014	.175	.135	.040	2.8	.01	001	6.2	7 0	5 0	397
1909	12	Jan.-Dec.	v. sl. to sl.	v. sl. to sl.	50	dist. veg.	37.5	16.5	21.0	.027	.178	.144	.034	3.3	.01	.000	5.8	7.0	4.0	682
1910	12	Jan.-Dec.	sl.	sl.	50	dist. veg.	42.5	19 5	23.0	.021	.222	.162	.060	3.6	.04	000	6.6	8.5	4.5	369
1911	11	Jan.-Nov.	v. sl. to sl.	v. sl.	67	dist. to decid. veg.	18.0	21.5	26.5	.022	.212	.182	030	3.7	.01	.000	7.9	10.5	4 0	478
1912	12	Jan.-Dec.	v. sl. to sl.	sl.	54	dist. veg.	38.5	15 5	23.5	.028	.185	.163	.022	3.1	.05	.000	6.0	7 5	4 0	614
1912 Maximum			sl. mic.-org.	cons. micro-org.	90	decid. veg.	55.0	17.0 20.0	38.0 38.0	.106	.238	.224 .224	.014 .054	5.0	.13	.002	9.3	15.5	5 5	4,500
1912 Minimum			none.	none.	35	f. veg.	28 5	12.0	16.5	001	.112	.100 .100	.012 .000	2.5	.00	.000	4.3	3.0	2 0	3

V. sl.=very slight; sl.=slight; cons.=considerable; f.=faint; dist.=distinct; decid.=decided; micro-org.=micro-organisms; veg.=vegetable.

During 1912, 10 of the samples showed the presence of amorphous matter and miscellaneous micro-organisms, including diatoms, protozoa, etc.

Woonsocket Water Supply.

(Sample from a tap at the city hall.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1907	12	Jan.-Dec.	v. sl.	v. sl.	50	dist. veg.	36.0	15.0	21.0	.019	.149	.132	.017	2.7	.04	.000	5.1	5.5	5.0	297	0
1908	12	Jan.-Dec.	v. sl.	v. sl.	49	dist. veg.	36.0	17.0	19.0	.015	.162	.139	.023	2.8	.04	.000	6.0	6.0	4.5	349	0 (occasional +)
1909	12	Jan.-Dec.	v. sl. to sl.	v. sl. to sl.	48	dist. veg.	37.0	16.0	21.0	.024	.156	.138	.018	3.4	.04	.000	5.8	7.0	4.0	1,334	0 (occasional +)
1910	12	Jan.-Dec.	sl. to decid.	v. sl. to sl.	51	dist. veg.	42.0	19.0	23.0	.021	.218	.170	.048	3.6	.04	.000	6.6	8.5	4.0	1,513	0 (occasional +)
1911	12	Jan.-Dec.	v. sl. to sl.	v. sl.	65	dist. veg.	46.0	21.0	25.0	.020	.200	.177	.023	3.7	.04	.000	7.9	11.5	4.0	354	0
1912	12	Jan.-Dec.	v. sl. to sl.	v. sl. to sl.	57	dist. veg.	39.5	16.0	23.5	.022	.180	.159	.021	3.3	.05	.000	6.0	7.5	4.0	336	0 (occasional +)
1912 Maximum			decid.	cons.	90	v. decid. veg.	54.5	20.0	34.5	.104	.228	.172 .210	.056 .060	5.2	.12	.001	8.9	15.5	5.5	1,500	+
1912 Minimum			none.	none.	40	f veg.	29.0	12.5 12.0	16.5 16.5	.006	.102	.098 .098	.004 .000	2.4	.00	.000	4.3	3.0	2.0	1	0

V. sl.=very slight; sl.=slight; decid.=decided; cons.=considerable; f.=faint; dist.=distinct; v. decid.=very decided; veg.=vegetable.

During 1912, ten of the samples showed the presence of amorphous matter and miscellaneous micro-organisms, including diatoms, protoza, etc.

EXAMINATION OF SPECIAL WATER SUPPLIES.

In addition to the regular routine examination of drinking water supplies, twenty-five special examinations were made, including samples from six manufactories, eight summer camps and hotels, five from springs, the water being sold as "spring water," one country school, one prospective town supply, two office buildings, and two swimming pools.

A new deep well had been driven by the Phillipsdale Paper Co., at Phillipsdale, East Providence, having a depth of 250 feet; one at the Waite–Thresher Manufacturing Co. building, in Providence; and one at the Pawcatuck Woolen Co., in Westerly. All these showed the water to be of a good sanitary quality, the hardness as is to be expected in all deep wells, being higher than in water from surface wells.

A sample of water was submitted by the Manville Co., in Woonsocket, taken from a well on Social Street, 14 feet deep, with a sluice way about 116 feet from the well. The analysis showed a distant pollution and the presence of the bacillus coli communis. Advice was given to utilize some other source of drinking water supply if it was available.

At the Saylesville Bleachery a supply taken from a deep well, from a faucet to which a large number of the operatives most frequently repaired for drinking water, was submitted for analysis.

At the Rhode Island Perkins Horse Shoe Co. works, at Valley Falls, it was desired to utilize the water from a deep driven well for drinking or other purposes. Upon analysis it was found by the State Board chemist to have a slightly acid reaction from the presence of sulphate of alumina. The bacteriologist found it to be sterile, perfectly free from bacteria. As this was an abnormal condition

for a deep well and could not be accounted for by natural conditions, a pollution was suspected from some manufacturing process located sufficiently near the well to impregnate the soil and subsoil water with acids, as occurs at times in connection with pickle works, jewelry coloring works, etc. Upon inquiry it was quickly ascertained that an iron foundry had been in operation for several years on a nearby property. Sulphuric acid is used in the process of cleaning iron castings and the refuse liquor from this operation had evidently escaped into the ground in sufficiently large quanties to saturate the surrounding soil for a long distance. The water was however a safe one for drinking purposes.

In connection with the inspection of summer camps and hotels, samples of water were taken from two wells used by the Rocky Point Camp. These two wells were located near the shore, at the bottom of the land slope and were not very deep. A large number of dry privy vaults were located in the camp on the land slope above. The results of the analysis showed them to be sufficiently pure for drinking purposes.

Water used at the Cold Spring House at Wickford, and a sample collected by Dr. Harold Metcalf, health officer of the town, from the Plum Beach Hotel, showed them both to be of good quality.

A new deep well had been driven at the Saint Vincent de Paul summer camp or colony, located at Nayatt. The water from this well proved to be of good quality.

A sample of water taken from the spring at Camp Rodman, the Boy Scouts' Camp, was examined to give assurance that the seven or eight hundred boys who were to occupy the camp during the summer would be protected with a good supply of drinking water. The laboratory tests proved it to be of a good sanitary quality.

Another boy's camp received similar protection, that of the Young Men's Christian Association at Wakefield.

A summer home for weekly children was located in the town of Warwick, under the auspices of the Society for Organizing Charities and the Providence Tuberculosis Association. The water supply was

secured from pipes leading from a distant spring. An analysis of this water showed it to be of good quality.

During previous years an examination of all the spring waters supplied in the State was made, the samples being taken at the spring, as well as from the containers in which this water is delivered to the customers. One new spring was examined; the Crystal Spring, at Narragansett Pier, located beside a pond. The supply bubbles into a well from a sandy bottom and the flow is considerable. The analysis showed it to be of good quality.

The Puritan Spring, located in Providence, and delivering water to the city of Providence and vicinity, was examined, the result being found to be the same as on previous examinations.

The Crystal Spring, Eureka Spring, and water which is used by the Newport Distilled Water Co., all located in Newport, were examined with similar results.

The town of Tiverton, meditating the introduction of a town supply of water, secured an analysis, the sample being taken from Stafford Pond.

The water in a well used by the Harris District School, in the town of Coventry, having acquired a peculiar taste was examined and many protoza were found to be present, as well as a hair-like filamentous growth. Upon thoroughly cleansing the well the condition of the water was improved for the time being.

A well driven 510 feet in the centre of the city of Providence for the purpose of securing an ample supply of water for use in the so-called Turks Head building, produced water which was saturated with chlorides, which would indicate that the geological formation permitted an inflow of salt water from the Providence River, located nearby, having a salt water tidal flow. The water could not be used for drinking purposes.

Water used in the Bell Block, in Wakefield, was found to be a potable water.

As has been determined by numerous investigators the water of a swimming pool rapidly becomes polluted from contact with the

bodies of those using the pool, and if the water is not changed frequently it is possible that sore throats or sore eyes may be produced by the passage of infectious material from a person having influenza, sore throat or other communicable disease, to others.

The expense of such large quantity of water as is needed to fill one of these swimming pools, when the water is secured from a water company, is so great that some means is necessary to use the same water over again after purification. This is accomplished in several ways, the most satisfactory and safe way being to treat the water in the pool with some substance which will gather together all the suspended particles of organic matter in the water, allowing it to settle to the bottom and then filtering the water over and over again. Hypochlorite of lime is useful for a preliminary treatment, and sulphate of alumina for completing the coagulation before filtering through sand filters under pressure. By this means the water can be kept not only clear and clean, but a large percentage of bacteria are removed from the polluted water.

Upon request of the management of the Army and Navy Swimming Pool at Newport, R. I., an examination of the results of treatment of the pool water was made. The working of the filter and the treatment given were satisfactory.

A similar attempt was made with the swimming pool located in the Young Men's Christian Association building in Woonsocket. The chemist of the Board made several inspections of the plant and gave repeated advice to those having charge of the purifying process, but a lack of understanding or inability to comply with the directions given resulted in a continuance of the pollution which kept accumulating.

As was shown by an examination and study of a pool during a previous year, located in the Young Men's Christian Association building in Pawtucket, under directions given by the chemist of the Board, it was possible to manage a plant of this kind with success.

These swimming pools are rapidly coming into use to the advantage of those who are privileged to use them, and being an important factor in the study of health matters should require constant supervision of intelligent engineers.

POLLUTION OF STREAMS.

Moshassuck and Woonasquatucket.—In 1906-07 the State Board of Health in coöperation with the U. S. Geological Survey, conducted a thorough inspection of the two streams in Rhode Island, named Moshassuck and Woonasquatucket Rivers, covering a period of eleven months. Careful determinations were made of the amount of pollution which existed in those streams from manufacturing or sewage wastes, at each point of pollution.

The results of this investigation were presented in the report published by this Board, entitled "Results of an examination of the conditions causing the pollution of the Moshassuck, Woonasquatucket and Providence Rivers," by Herman Stabler, of the U. S. Geological Survey, who was detailed to the work. These services were made possible, the State Board of Health having a fully equipped laboratory which could be utilized to carry out the necessary analyses called for in such an investigation.

All the manufacturers using these streams for discharge of their wastes assisted the department in every way possible, involving considerable expense at times on the part of the manufacturer. No statutes make provision for the prevention of pollution of streams not used as a drinking water supply.

These two rivers meet in the center of the city of Providence and fermentation of the mixed wastes occur all along the streams. Soon after the rivers meet they flow into contact and are mixed with tide water. The admixture of decaying organic matter and chemicals with the saline content of tide water produces noxious gases, which in warm weather are diffused through a portion of the business section of the city. Much sediment is deposited all along the stream and causes accumulation of decomposing matter.

Following this investigation a more thorough and detailed examination of the character and estimated quantity of the wastes from each manufactory and experiments on purification of the same were made by this Board, the work being done by Mr. Herman Stabler of the U. S. Geological Survey, and Gilbert H. Pratt, Chief Chemist of the Board. The results were published in a report* which contains much valuable data as to methods of treatment of wastes from cotton, dyeing and bleaching, from wool manufacture, and from establishments making oleomargerine, glue and fertilizer.

Public discontent arising from the presence of these disagreeable odors in 1912 caused the Mayor of the City of Providence, Hon. Henry Fletcher, to order the City Engineer's Department to ascertain the names of all persons or corporations located within the city limits who had not complied with an order to connect their drains and waste pipes with the city sewer.

In March, also, a contract was made with a dredging company to remove the sediment in the river at the most central point in the city. Large quantities of mud were removed with much difficulty, deepening the channel somewhat, but with the daily deposit of the suspended solids coming from both streams, aided by the dumping of snow, carrying with it street sweepings, there is the possibility of the river being again filled up after numerous freshets. Until all manufacturers' wastes are excluded from the two streams, there is no way of preventing the combination with the sea water and the generation of offensive odors.

Common justice as well as law provides that a water right, privilege or possession, on a flowing stream, must not be diverted from the stream in any way which will reduce the quality or quantity of the water in the stream as it was originally provided by nature. It seems hardly fair that one manufacturer should take away water which will benefit his neighbor, either by wasting it or, which is the same thing, by defiling it. It is not an uncommon thing, however,

*U. S Geological Survey, Water Supply Paper No. 235; "The Purification of some Textile and other Factory Wastes," by Herman Stabler and Gilbert H. Pratt.

for a manufacturer to complain to his neighbors upstream, while at the same time he is pouring refuse into the same stream below his mill to the detriment of those located further down.

It would appear as if a state law might be provided which would be of advantage to all concerned, while a federal law under interstate control might provide for the prevention of one state using a river for a sewer which another state may be obliged to use for domestic or manufacturing purposes.

In order to secure figures for comparison with those obtained in the previous work, in 1906–1907, especially on the lower part of the rivers, during 1912 samples from about six inches below the surface were taken on both of these rivers, with results as presented in the following tables. In these tables under residue on evaporation, it will be noted that two sets of figures are given in some cases under the maximum and minimum figures. The upper figures of the two presented are the actual figures obtained on the determination giving the maximum or mimimum total residue on evaporation. The lower figures are the true maximum or minimum figures obtained for the determinations for which the figures are presented.

Results obtained indicate that conditions on the Moshassuck River are extremely bad as to mill pollution at the upper station taken, namely Branch Avenue, and that in a general way are not much worse, but possibly a little better, due to sedimentation, at the three lower stations. The influence of the Silver Spring Bleachery on the West River is plainly shown. The greatest jump in the pollution on the Woonasquatucket River is between Atwells Avenue and Eagle Street, and is apparently due to the influence from the Queen Dyeing Company and the Revere Rubber Company.

The State Board of Health has no control over streams which are not used for drinking purposes. All streams which are thus used may receive attention from the Board in the way of legal control against pollution, by notification for removal of the cause of pollution.

Moshassuck River.

(Table showing results obtained at 6 points on this stream, giving the average of 6 samples at each station, taken every other month, from January–November, 1912.)

(Parts per 1,000,000.)

	No. of Samples.	Date of Collection.	Appearance.			Odor. (Cold.)	Residue on Evaporation.			Nitrogen.		Sulphates.	Iron.	Chlorine.	Oxygen Consumed.	Fats.	Alkalinity.	Bacteria per c. c.	B. coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	As Free Ammonia.	As Total Organic.								
West River, at Charles Street Station 25	6	Jan.-Nov.	sl.	sl. to cons.	47	f. veg. and unpl.	*115 †101	21 17	94 84	16	.73	moderate	.76	8.9	5.5	3.8	23.0	8,500	(3=+) (3=0) 0 to +
West River, at West River St. Station 26.	6	Jan.-Nov.	v.decid	heavy	off color	dist. to strong of millwaste and bleachery.	*692 †474	171 92	521 382	.30	2.32	heavy	1.78	41.9	56.3	33.9	75.0	12,860	0 (1=+)
Mos. River, at Branch Ave. Station 37	6	Jan.-Nov.	great	heavy	dirty brown	decid. unpl. to offensive.	*557 †469	151 94	406 375	2.72	8.06	heavy	2.60	51.3	51 9	34.9	160.0	3,163,300	0 (2=+)
Mos. River, at Pettis Street Bridge Sta. 38.	6	Jan.-Nov.	great	v. cons.	dirty brown	decid. unpl. to disagreeable.	*538 †471	133 93	405 381	1.35	5.73	heavy	2.14	46.1	50 4	30 8	141.0	4,946,600	
Mos. River, Mill St. Station 40.	6	Jan.-Nov.	great	v cons. to heavy	dirty brown	decid. unpl. to disagreeable.	*523 †159	125 81	398 378	.83	6.17	heavy	3.67	45.5	47.5	26.9	141.0	6,494,200	
Mos. Riv., Smith St. Station 41.	6	Jan.-Nov	great	heavy	dirty brown	decid. unpl. to disagreeable.	*513 †141	119 77	394 364	.78	5.73	heavy	3.71	44.8	45.5	23.8	140 0	10,060,800	0 (1=+)

Sl.=slight; v. decid.=very decided; cons.=considerable; v. cons.=very considerable; f.=faint; dist.=distinct, decid.=decided; veg.=vegetable; unpl.=unpleasant. *Unfiltered sample. †Filtered sample.

These samples were hourly composites, 12 samples being taken, commencing at 7 A. M. and ending at 6:30 P.M.

Moshassuck River.

(Table giving the averages presented in the preceding table, together with the maximum and minimum figures obtained at each station during the series.)

(Parts per 1,000,000.)

	No. of Samples.	Date of Collection.	Appearance.			Odor. (Cold.)
			Turbidity.	Sediment.	Color.	
West River, at Charles St. Station 25.....	6	Maximum	decid.	cons.	65	dist. veg. and unpl.
		Average	sl.	sl. to cons.	47	f. veg. and unpl.
		Minimum	v. sl.	v. sl.	35	f. veg.
West River, at W. River St. Station 26.....	6	Maximum	v. great	v. heavy	off color.	strong of bleachery wastes.
		Average	v. decid.	heavy	off color.	dis.t to strong of mill wastesand bleachery.
		Minimum	decid.	v. cons.	Turbid, about 55	dist. unpl. and oily.
Mosh. River, at Branch Ave. Station 37.....	6	Maximum	v. great	heavy	blackish brown	decid. offensive.
		Average	great	heavy	dirty brown	decid. unpl. to offensive.
		Minimum	great	v. cons.	dirty brown	decid. unpleasant.
Mosh. River, at Pettis St. Station 38.....	6	Maximum	v. great	heavy	blackish brown	decid. disagreeable and of textile wastes.
		Average	great	v. cons.	dirty brown	decid. unpl. to disagreeable.
		Minimum	v. decid.	cons.	brown	decid. unpleasant.
Mosh. River, at Mill St. Station 40.....	6	Maximum	v. great	heavy	blackish brown	decid. disagreeable and of textile wastes.
		Average	great	v. cons. to heavy	dirty brown	decid. unpleasant to disagreeable.
		Minimum	v. decid.	v. cons.	brown	decid. unpleasant.
Mosh. River, at Smith St. Station 41.....	6	Maximum	v. great	v. heavy	blackish brown	decid. disagreeable and of textile wastes.
		Average	great	heavy	dirty brown	decid. unpleasant to disagreeable.
		Minimum	v. decid.	v. cons.	brown	decid. unpleasant.

Moshassuck River.—Concluded.

Residue on Evaporation.			Nitrogen.									
Total.	Loss on Ignition.	Fixed.	As Free Ammonia.	As Total Organic.	Sulphates.	Iron.	Chlorine.	Oxygen Consumed.	Fats.	Alkalinity.	Bacteria per c. c.	B. Coli
180	17 25	163 163	.37	1.00	v. cons.	1.40	13.0	6.4	9.2	37.0	30,900	+ 0 to +
115	21	94	.16	.73	moderate	.76	8.9	5.5	3.8	23.0	8,500	(3=+) (3=0)
65	20 17	45 45	.07	.44	low	.34	4.2	5.0	2.0	8.0	1,650	0
1,289	223 297	1,066 1,066	.59	4.13	great	3.00	76.0	82.4	64.0	200.0	61,400	+
692	171	521	.30	2.32	heavy	1.78	41.9	56.3	33.9	75.0	12,860	0 (1=+)
168	49	119	.16	.80	v. cons.	.96	10.5	19.6	9.6	19.0	8	0
782	175 199	607 607	4.72	11.05	great	3.20	75.0	76.8	53.6	250.0	7,600,000	+
557	151	406	2.72	8.06	heavy	2.60	51.3	51.9	34.9	160.0	3,163,300	0 (2=+)
278	85	193	.79	4.69	v. cons.	1.68	24.0	25.2	14.4	70.0	29,800	0
783	152 182	631 631	2.59	9.15	great	3.20	70.5	74.0	40.4	236.0	6,900,000	.....
538	133	405	1.35	5.73	heavy	2.14	46.1	50.4	30.8	141.0	1,946,600	.....
219	61	158	.10	2.62	v. cons.	1.60	17.8	19.6	11.6	40.0	less than 100	.....
775	161 162	614 614	1.74	10.14	great	8.40	70.5	73.6	34.0	228.0	27,500,000	.....
523	125	398	.83	6.17	heavy	3.67	45.5	47.5	26.9	141.0	6,494,200	.....
231	59	172	.13	2.56	v. cons.	1.64	16.4	21.2	12.8	42.0	11,200	.....
732	140 153	592 592	1.67	10.33	great	7.20	70.5	68.0	33.2	224.0	44,600,000	+
513	119	394	.78	5.73	heavy	3.71	44.8	45.5	23.8	140.0	10,060,800	0 (1=+)
231	60	171	.13	3.02	v. cons.	2.28	15.2	22.0	13.6	42.0	7,600,000	0

v. sl.=very slight; sl.=slight; decid.=decided; v. decid.=very decided; v. great.=very great; cons.=considerable; v. heavy.=very heavy; v. cons.=very considerable; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant.

Woonasquatucket River.

(Table showing results obtained at 8 points on this stream giving the average of 6 samples at each station, taken every other month from April through December 1912, together with a sample in March.)

(Parts per 1,000,000.)

	No. of Samples.	Date of Collection.	Appearance.			Odor. (Cold.)	Residue on Evaporation.			Nitrogen.		Sulphates.	Iron.	Chlorine.	Oxygen Consumed.	Fats.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	As Free Ammonia.	As Total Organic.								
Bosworth St., Sta. 8	6	Mar.-Dec.	sl.	sl. to cons.	54	f. to dist., veg.	*79	21	55	.16	.81	low	.94	6.4	7.0	6.3	14.0	20,860	+ (1=0)
							†62	18	44										
Delaine St., Sta. 10	6	Mar.-Dec.	sl. to decid.	cons. to sl.	56	f. to dist., veg.	*81	23	58	.18	.94	low	1.01	6.6	7.0	6.1	15.0	45,900	.....
							†63	18	45										
Atwells Ave., Sta. 11	6	Mar.-Dec.	decid.	cons.	55	f. to dist., veg.	*91	24	67	.22	1.02	low	1.02	9.0	7.4	5.6	17.5	47,630	.....
							†75	18	57										
Eagle St., Sta. 12	6	Mar.-Dec.	decid. to v. decid.	cons.	off color	f. to dist., unpl. (millwaste).	*162	41	121	.30	1.40	mod.	1.37	16.9	21.0	7.4	38.0	895,850	0 (2=+)
							†133	25	108										
Am. Loco. Works, Sta. 13	6	Mar.-Dec.	v. decid.	cons. to v. cons.	off color	dist., unpl.	*224	41	183	.19	1.81	mod.	1.36	54.9	16.2	6.0	35.0	981,920	+ (1=0)
							†194	29	165										
Acorn St. Bridge., Sta. 14	6	Mar.-Dec.	decid. to v decid.	cons. to v. cons.	off color	dist., unpl. to oily.	*304	48	256	.20	1.71	mod. to cons	1.54	93.6	15.2	4.8	35.5	1,078,530	.....
							†272	39	233										
Foot bridge, 500 ft. below Acorn St., Sta. 15	6	Mar.-Dec	decid. to v. decid.	v. cons.	off color	dist., unpl. to oily.	*649	98	551	.40	1.78	cons.	2.08	259.5	16.2	4.3	40.5	1,232,830	.....
							†608	90	518										
Gaspee St., Sta. 16	6	Mar.-Dec.	decid.	v. cons.	off color.	f. to dist., unpl. to oily.	*2,125	282	1,843	.34	1.79	heavy	3.22	978.7	14.7	2.8	40.0	1,928,680	+ (1=0)
							†2,042	248	1,794										

Sl.=slight; decid.=decided; v. decid.=very decided; cons.=considerable; v. cons.=very considerable; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant; mod.=moderate.

*Unfiltered sample. †Filtered sample. These samples were hour and a half composites, 8 samples being taken, commencing at 7 A. M. and ending at 6:20 P. M.

Woonasquatucket River.

(Table giving the averages presented in the preceding table, together with the maximum and minimum figures obtained at each station during the series.)

(Parts per 1,000,000.)

	No. of Samples.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Odor. (Cold.)	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Nitrogen. As Free Ammonia.	As Total Organic.	Sulphates.	Iron.	Chlorine.	Oxygen Consumed.	Fats.	Alkalinity.	Bacteria per c. c.	B. Coli.
Woon. River, at Bosworth St., Station 8.		max.	decid.	cons.	about 75	dist. veg.	98	32	66	.26	1.26	mod.	1.70	7.4	9.6	16.0	19.0	51,300	+
								34	66										+
	6	avg.	sl.	sl. to cons.	54	f. to dist. veg.	79	24	55	.16	.81	low	.94	6.4	7.0	6.3	14.0	20,860	(1=0)
		min.	none.	sl.	40	v. f. veg.	63	20	43	.01	.53	v. low	.46	4.8	5.7	1.2	11.0	50	0
								18	43										
Woon. River, at Delaine St., Station 10.		max.	decid.	cons.	about 80	dist. veg.	95	24	71	.28	1.25	mod.	1.70	7.6	8.8	18.0	19.0	160,000	.....
	6	avg.	sl. to decid.	cons. to sl.	56	f. to dist. veg.	81	23	58	.18	.94	low	1.01	6.6	7.0	6.1	15.0	45,900	.....
		min.	none.	sl.	40	f. veg.	62	19	43	.08	.64	v. low	.54	5.2	5.9	.8	11.0	1,400	.....
Woon. River, at Atwells Ave., Sta. 11		max.	v. decid.	cons.	about 80	dist. veg. & oily.	114	29	85	.36	1.71	mod.	1.60	12.8	8.6	16.0	25.0	120,000	.....
								29	86										
	6	avg.	decid.	cons.	55	f. to dist. veg.	91	24	67	.22	1.02	low	1.02	9.0	7.4	5 6	17.5	47,630	.....
		min.	v. sl.	sl.	about 40	f. veg.	72	22	50	.10	.55	low	.48	5.8	6.2	2.0	12.0	50	.....
								21	50										

sl.=slight; decid.=decided; v. decid.=very decided; cons.=considerable; v. cons.=v. considerable; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant; v low=very low; mod.=moderate.

Woonasquatucket River.—Continued.

	No. of Samples.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Odor. (Cold.)	Residue on Evaporation. Total.	Residue on Evaporation. Loss on Ignition.	Residue on Evaporation. Fixed.	Nitrogen. As Free Ammonia.	Nitrogen. As Total Organic.	Sulphates.	Iron.	Chlorine.	Oxygen Consumed.	Fats.	Alkalinity.	Bacteria per c. c.	B. Coli.
Woon. River, at Eagle St., Station 12.....	6	max.	v. decid.	v. cons.	about 140	dist. of millwaste.	247	56	191	.67	2.08	cons.	2.50	23.6	31.2	14.0	70.0	3,900,000	+
		avg.	decid to v. decid.	cons.	off color	f. to dist., unpl., millwaste.	162	41	121	.30	1.40	mod.	1.37	16.9	21.0	7.4	38.0	895,850	0 (2=+)
		min.	decid.	cons.	about 55	f. veg. and unpl.	100	30	70	.03	.81	low	.66	9.2	14.6	3.6	15.5	less than 100	0
Woon. River, American Loco. Works, Station 13.....	6	max.	great	v. cons.	about 100	dist. of millwaste.	627	64	563	.52	4.87	v. cons.	2.20	258.0	24.6	8.8	62.0	2,800,000	+
		avg.	v. decid.	cons. to v. cons.	off color	dist. unpl.	224	41	183	.19	1.81	mod.	1.36	54.9	16.2	6.0	35.0	981,920	+ (1=0)
		min.	decid.	cons.	about 55	f. veg. and unpl.	100	26 26	74 70	.04	.77	low	.60	9.2	10.4	2.8	14.5	5,000	0
Woon. River, Acorn St., Station 14...	6	max.	v. decid.	v. cons.	90	dist. of millwaste.	1,124	124	1,000	.49	3.53	heavy	2.50	490.0	21.8	7.2	60.0	3,700,000	.....
		avg.	decid. to v. decid.	cons. to v. cons	off color	dist. unpl. to oily.	304	48	256	.20	1.71	mod. to cons.	1.54	93.6	15.2	4.8	35.5	1,078,530	.....
		min.	decid.	cons.	about 60	f. veg. and unpl.	94	29 24	65 65	.07	.76	low	.74	9.1	9.8	2.8	13.5	1,150	.....

sl.=slight; decid.=decided; v. decid.=very decided; cons.=considerable; v. cons.=very considerable; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant; v. low=very low; mod.=moderate.

Woonasquatucket River.—Concluded.

	No. of Samples.	Date of Collection.	Appearance.			Odor. (Cold.)	Residue on Evaporation.			Nitrogen.		Sulphates.	Iron.	Chlorine.	Oxygen Consumed.	Fats.	Alkalinity.	Bacteria per c. c.	B. Coli
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	As Free Ammonia.	As Total Organic.								
Woon. River, foot bridge, 500 yards below Acorn St., Station 15.....		max.	v. decid.	heavy	about 110.	decid. of millwaste.	2,870	400	2470	1.15	3.26	heavy.	3.20	1330.0	26.0	7.2	72.0	3,400,000	.....
	6	avg.	decid. to v. decid	v. cons.	off color	dist. unpl. to oily.	649	98	551	.40	1.78	cons.	2.08	259.5	16.2	4.3	40.5	1,232,830	.....
		min.	decid.	cons.	about 55	f. veg. and unpl.	100	32 28	68 68	.07	.93	low.	1.02	10.6	9.8	.8	14.0	7,000	.....
Woon. River at Gaspee St., Station 16.		max.	v. decid.	heavy	about 140	dist. unpl,. and oily.	4,960	660	4,300	.59	3.51	v. heavy	7.60	2340.0	22.4	6.8	76.0	7,100,000	+
	6	avg.	decid.	v. cons.	off color	f. to dist., unpl. to oily.	2,125	282	1,843	.31	1.79	heavy.	3.22	978.7	14.7	2.8	40.0	1,928,680	+ (1=0)
		min.	sl.	sl.	48	f. veg.	149	28	124	.11	.85	mod.	.96	39.4	8.3	.4	14.5	2,100	0

sl.=slight; decid.=decided; v. decid.=very decided; cons.=considerable; v. cons.=very considerable: f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant; v. low.=very low; mod.=moderate.

Clear River.—The State Sanatorium, for the reception of incipient cases of tuberculosis, receives its water supply from Wallum Lake, but a few hundred yards distant. The overflow or outlet of this pond or lake, passes through a shallow brook which finds its way to Wilson's Pond about two miles below. The sewage disposal plant delivers its effluent into this brook below the Sanatorium. As the water leaves the lake it is of good quality. In order to determine whether the purified sewage was materially detrimental to the character of the water on the stream, a sample was taken every month below the outlet of the lake at the location of an old saw mill, but some distance above where the sewage effluent enters. A second sample was taken at a plank bridge, located a short distance below this, and a third from the stream just before it enters Wilson's Pond.

The following results of examinations, while showing an influence on the quality of the water in the stream, yet the amount and the character of the pollution, by the time it reaches Wilson's Pond, is somewhat reduced.

For explanation of the two sets of figures given under maximum and minimum for 1912, see page 16.

Clear River (Burrillville).

(Sample of this stream at the location of an old saw mill at a point above the State Sanatorium sewage plant.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1908	10	Feb.-Dec.	none.	v. sl. to sl.	13	f. to dist. veg. and unpl.	21.0	9.5	14.5	.014	.077	.065	.012	1.9	.01	.000	2.2	1.0	2.5	4,750	0 (when done).
1909	11	Jan.-Dec.	none.	v. sl.	11	v. f. to f., veg. to unpl.	22.0	7.5	14.5	.019	.073	.066	.007	1.9	.02	.000	2.0	2.0	2.0	2,420	0 to presumptive + (when done).
1910	*12	Jan.-Dec.	none.	v. sl.	13	v. f. veg.	27.0	11.0	16.0	.016	.092	.080	.012	2.2	.03	.000	3.6	3.5	2.5	22,500	0 to presumptive +
1911	12	Jan.-Dec.	none.	v. sl.	6	v. f. to f. veg.	22.0	6.5	15.5	.012	.068	.063	.005	2.3	.03	.000	1.6	5.0	2.5	550	0
1912	12	Jan.-Dec.	none.	v. sl.	11	f. veg.	22.5	7.0	15.5	.011	.077	.072	.005	2.3	.01	.000	2.0	2.5	2.5	557	0 to +(four +)
1912 Maximum			v. sl.	sl.	15	dist. veg.	27.5	8.5 11.0	19.0 19.0	.038	.090	.080 .080	.010 .012	3.0	.11	.001	2.4	5.5	4.0	4,600	+
1912 Minimum			none.	none.	8	v. f. veg.	19.0	4.5 4.5	11.5 11.5	.002	.066	.066 .060	.000 .000	1.8	.02	.000	1.2	0.0	1.5	5	0

V. sl.=very slight; sl.=slight; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable. *One "freak" sample.

This stream is the outlet of Wallum Lake.

Clear River (Burrillville).

(Sample of this stream at a plank bridge, crossing the stream at a point below the State Sanatorium sewage plant.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1908	11	Jan.-Dec.	none.	sl.	17	f. veg.	25.0	10.0	15.0	.123	.087	.074	.013	2.3	.04	.002	2.7	1.5	3.0	19,750	0 and + (when done.)
1909	11	Jan.-Dec.	none.	sl. to v.sl.	15	v. f. to f. veg. to unpleasant.	26.0	9.5	16.5	.252	.097	.088	.009	2.5	.01	.002	2.5	2.0	3.0	6,516	0 and presumptive + (when done.)
1910	12	Jan.-Dec.	none.	v. sl. to sl.	16	v. f. to f. veg. to unpleasant.	30.5	11.0	19.5	.216	.104	.089	.015	2.9	.08	.004	3.0	3.0	3.5	46,700	Presumtive + and 0
1911	12	Jan.-Dec.	none. to v. sl.	v. sl.	11	f. veg. to unpl.	29.0	10.5	18.5	.210	.091	.080	.011	3.2	.08	.001	2.3	6.0	3.5	11,867	0 to +
1912	12	Jan.-Dec.	none.	v. sl.	14	f. veg.	28.0	9.0	19.0	.132	.091	.085	.006	2.8	.07	.003	2.5	3.5	3.0	2,089	0 to +
1912 Maximum	...	.....	v. sl.	cons.	25	dist. veg. and unpl.	36.0	11.5	24.5	.336	.140	.130 .130	.010 .014	3.9	.13	.022	3.9	8.0	4.0	13,300	+
1912 Minimum	...	.....	none.	v. sl.	9	v. f. veg.	22.0	10.5 6.0	11.5 11.5	.002	.072	.058 .058	.014 .000	2.2	.00	.000	1.8	1.0	2.0	7	0

V. sl.=very slight; sl.=slight; cons.=considerable; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable.

Clear River (Burrillville).

(Sample of this stream near Wilson's Pond, this point being approximately two miles below previous sampling point.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid.				As Nitrates.	As Nitrites.					
											Total.	In Solution.	In Suspension.								
1908	8	Feb.-Dec.	none to v.sl.	sl.	17	f. veg.	26.5	9.5	17.0	.068	.091	.072	.019	2.2	.02	.001	2.8	1.5	3.5	5,700	0 and + (when done)
1909	10	Jan.-Nov.	none to v.sl.	v. sl. to sl.	18	v. f. to f. veg. to unpl.	26.0	9.0	17.0	.159	.095	.077	.018	2.5	.04	.001	2.7	2.0	2.5	5,636	0 and presumptive + (when done)
1910	11	Jan.-Dec.	none.	v. sl. to sl.	15	f. veg.	29.5	11.0	18.5	.128	.096	.080	.016	2.8	.07	.002	2.6	4.0	3.5	15,820	Presumptive + and 0
1911	12	Jan.-Dec.	none to v.sl.	v. sl.	12	f. veg. to unpl.	29.5	10.5	19.0	.161	.086	.080	.006	3.1	.08	.001	2.5	5.5	3.5	*4,560	0 to +
1912	12	Jan.-Dec.	none.	v. sl.	16	f. veg.	27.5	8.5	19.0	.104	.093	.085	.008	2.8	.07	.002	2.8	4.0	3.0	1,639	+ to 0
1912 Maximum			v. sl.	v.cons.	30	dist. veg.	35.5	10.5 11.5	25.0 25.0	.346	.140	.102 .112	.038 .038	4.0	.21	.012	4.6	8.0	4.5	8,400	+
1912 Minimum			none.	v. sl.	7	v. f. veg.	22.0	6.0	16.0	.002	.072	.072	.000	1.9	.00	.000	1.3	0.0	1.5	8	0

V. sl.=very slight; sl.=slight; v. cons.=very considerable; v. f.=very faint; f.=faint; dist.=distinct; veg.=vegetable; unpl.=unpleasant.

*Excluding one high count, sample probably contaminated in collection.

Pawcatuck River.—The Pawcatuck River is a stream of considerable flow, located on the southwestern boundry of Rhode Island, separating that state from Connecticut. It has been utilized in recent years as a suitable location for textile manufactories. Manufactories of this kind locate upon a stream supplying a goodly quantity of a clean, soft and clear water. These qualities which may be available to the manufactory located the highest up stream may not be maintained for works located further down the stream, for by the same token the convenience of the stream for securing water also is a convenience for the disposal of wastes from the factory. With dyeing and bleaching the wastes carry much kier liquor, which has a strongly alkaline reaction, also washings of a soapy character, as well as refuse dye, which strongly discolors the water. As the edge of the stream is more and more sought after for factory sites, it was early seen by the Board that the question would sooner or later be asked as to the past as well as the present and future character of the water.

Samples were taken from the stream at the dam of the Pawcatuck Woolen Co., as follows:

Pawcatuck River (Westerly).

(Sample of this stream at the dam of the Pawcatuck Woolen Company. Sampling of this stream was begun in 1911.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.	B. Coli.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.					
1911	3	May-Nov.	v. sl.	v. sl.	77	decid. veg.	44.5	19.5	25.0	.017	.176	.155	.021	5.2	.01	.001	8.8	6.0	4.5	396	+ (one 0)
1912	3	Apr.-Nov.	v. sl.	v. sl.	69	decid. veg.	43.5	18.0	25.5	.016	.157	.139	.018	4.7	.04	.000	8.0	7.0	4.0	83 0	(one +)
1912 Maximum			v. sl.	v. sl.	78	decid. veg.	50.0	18.0 19.5	32.0 32.0	.024	.162	.140 148	.022 .024	5.4	.08	.000	9.3	9 5	5 0	160	+
1912 Minimum			none.	v. sl.	62	dist. veg.	37.5	19.5 16.0	18.0 18 0	.004	.154	.130 130	.024 .008	3.6	.01	.000	6.7	5.0	3 0	8 0	

V. sl.=very slight; dist.=distinct; decid.=decided; veg.=vegetable.

During 1912, all three of the samples taken showed the presence of amorphous matter or diatoms and protozoa.

For explanation of double figures under maximum and minimum for 1912, see page 16.

SEWAGE PURIFICATION PLANTS.

The periodical examination of the working of the several sewage disposal plants has been maintained. Chemical and bacteriological analyses of the crude sewage received for treatment, and of the effluent, have been made permitting of a study of the value of different forms of treatment of each. By coöperation with the departments having charge of the plants in operation, interesting and valuable data has been secured and advice to those departments has been of service in perfecting the processes utilized for purification of each particular sewage.

The processes used at the different plants differ considerably and the study of the various methods and the work obtained, places this Board in a position to intelligently advise other cities or towns contemplating treatment of their sewage, or in making changes in the methods previously used.

There were five sewage purification plants in operation during 1912. Sampling points were selected at 24 different points each month, making the total number of sewage examinations, 288.

This year analyses were made of crude sewage and effluent from the plants of the cities of Providence and Woonsocket; also from the plant at Pawtucket until the sewers were connected with the sewerage system of the city of Providence, Nov. 18, 1912, and from the sewage system disposal plant at the State Sanatorium. Sampling at Central Falls was temporarily discontinued in August 1912, owing to disarrangement of the main underdrains which became submerged on account of filling and construction of the Grand Trunk Railway roadbed. A portion of the city waste had heretofore been treated very satisfactorily by the city of Pawtucket by sedimentation, followed by filtration through sand beds. Much valuable information, experience and data in regard to handling a sewage of the character delivered was obtained through the coöperation of the City Engineer of Pawtucket, Mr. G. A. Carpenter, and the State Board of Health.

The sewage after treatment was delivered into the Moshassuck River comparatively free from color. This served to dilute in a slight measure the black and vari-colored river water which had been polluted before it reached the sewage filtration plant.

The entire sewage of the city of Providence is delivered at a pumping station located near the purification plant. This consists of a series of large concrete reservoirs or tanks. The sewage in its passage from pumps to tanks is treated with chemicals. Originally sulphate of iron and unslacked lime were used for a time. The use of these has been supplanted by hypochlorite of lime, this chemical having the power to destroy most pathogenic or disease producing bacteria and especially those found in the typhoid and colon groups, the organisms which come from intestinal and urinal excretions of man and animals.

The treated sewage is in the tanks for a sufficient length of time for the suspended matter to settle to the bottom. The supernatent fluid is run off into the Providence River. The accumulated settlement or sludge is pumped into powerful presses and the excess of fluid is expressed or squeezed out between layers of canvas, leaving a mass or "cake" which is transferred to scows, carried to a point well down Narragansett Bay and dumped, where there is a swift outgoing tide.

The city of Providence maintains a permanent analyst at the purification plant. Daily samples are examined at all the different stages of the process to determine the amount of purification effected.

The following tables show the results of the examinations made by this Board, giving averages for six years for comparison, and the maximum and minimum figures for the year 1912. The bacteriological results do not show such correct results as the chemical figures, owing to the lapse of time occurring between the collection of samples and the "plating," thus permitting an increase of bacteria in the samples. During that time the figures or counts would become abnormally large and would not represent the actual number of bacteria present at the time of sampling.

The samples taken during the last two years are "composite," or mixed samples of collections taken hourly during the day, while those of previous years were so-called "grab" samples, being taken at one time at any time of the day.

Tables are presented which show the results obtained at each of the above plants referred to, also from the septic treatment at Narragansett Pier which is carried on through the summer months.

In connection with figures which appear under the maximum and minimum results for residue on evaporation and albuminoid ammonia in solution and suspension, explanation should be made that the upper figures are those obtained on the determinations which gave the maximum or minimum totals. The lower figures are the true maximum or minimum figures for the respective determinations.

Central Falls Sewage.

(Sample from the small well before entering tanks, Lonsdale Avenue sewer.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid.				As Nitrates.	As Nitrites.				
											Total.	In Solution.	In Suspension.							
1907	10	Jan.-Dec.					1,725	1,177	548	116.7	24.3	14.0	10.3	319			238			19,600,000
1908	12	Jan.-Dec.					1,959	1,061	898	122.7	27.8	13.8	14.0	272			311			11,900,000
1909	12	Jan.-Dec.					1,662	1,017	645	126.6	24.4	12.6	11.8	271			238			9,960,000
1910	12	Jan.-Dec.					1,601	915	686	127.2	25.3	10.4	14.9	231			225			14,000,000
1911	12	Jan.-Dec.					1,779	1,171	608	141.3	29.4	13.6	15.8	326			280			7,000,000
1912	7	Jan.-July					1,658	966	692	118.7	30.3	13.8	16.5	308			261			11,220,000
1912 Maximum							2,072	1,341	728	142.8	39.0	21.2	17.8	466			366			29,000,000
								1,341	886			21.2	20.8							
1912 Minimum							1,276	778	498	95.0	22.4	10.4	12.0	145			168			555,000
								616	498			8.8	11.0							

This sample is an hourly composite, 7 a. m. to 5 p. m.

Central Falls Sewage.

(Sample from the outlet of the septic tank.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	4	Jan.-May.	.....	.....	.....	.....	1,084	894	190	129.0	16.7	11.2	5.5	232	....	....	163	....	....	57,300,000
1908	6	July-Dec.	.....	.....	.....	.....	1,104	850	254	108.8	12.3	7.0	5.3	254	....	....	114	....	....	4,300,000
1909	12	Jan.-Dec.	.....	.....	.....	.....	1,026	801	222	119.0	12.2	7.0	5.2	228	....	....	114	....	....	3,450,000
1910	12	Jan.-Dec.	.....	.....	.....	.....	1,099	855	244	113.6	12.9	6.5	6.4	247	....	....	120	....	....	9,400,000
1911	12	Jan.-Dec.	.....	.....	.....	.....	1,218	967	251	131.3	15.5	7.1	8.4	293	....	....	135	....	....	4,300,000
1912	7	Jan.-July	.....	.....	.....	.....	1,076	798	278	124.9	15.4	7.9	7.5	245	....	....	142	....	....	11,740,000
1912 Maximum			.....	.....	.....	.....	1,436	968	468	163.4	20.8	10.0 11.0	10.8 10.8	334	....	....	188	....	....	49,000,000
1912 Minimum			.....	.....	.....	.....	862	636 636	226 208	96.8	12.2	4.4 4.4	7.8 5.4	150	....	....	106	....	....	500,000

This sample is an hourly composite, 7 a. m. to 5 p. m.

Central Falls Sewage.

(Sample from a distributing well, while discharging settled septic sewage onto beds.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid.				As Nitrates.	As Nitrites.				
											Total.	In Solution.	In Suspension.							
1907	4	Jan.-May					1,118	957	161	116.7	15.3	12.3	3.0	261			151			9,300,000
1908	6	July-Dec.					1,141	944	197	106.0	12.0	8.1	3.9	286			108			3,600,000
1909	12	Jan.-Dec.					1,015	838	177	99.7	11.1	7.9	3.2	242			108			3,770,000
1910	12	Jan.-Dec.					1,066	894	172	106.5	12.1	7.0	5.1	261			114			5,100,000
1911	12	Jan.-Dec.					1,192	1,013	189	122.7	15.0	8.6	6.4	294			141			5,830,000
1912	7	Jan.-July					1,119	876	243	112.3	14.8	8.9	5.9	272			119			10,530,000
1912 Maximum							1,211	1,010 1,010	234 316	136.6	19.2	10.0 11.8	9.2 9.2	360			176			39,000,000
1912 Minimum							910	670 670	240 188	82.4	11.6	6.8	4.8	170			110			280,000

This sample is a quarter-hour composite.

Central Falls Sewage.

(Sample from distributing well, while discharging settled sewage, septic tank not in use.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid.				As Nitrates.	As Nitrites.				
											Total.	In Solution.	In Suspension.							
1907	6	July-Dec.	.....	.....	....	.....	1,272	1,074	198	91.9	15.4	10.0	5.4	335	....	....	148	....	....	9,200,000
1908	6	Jan.-June	.....	.....	....	.....	1,123	884	239	107.6	17.9	12.4	5.5	197	....	....	214	....	....	9,400,000

This sample is a quarter-hour composite.

All samples in 1909, 1910, 1911 and 1912 were while septic tank was in use, thus no figures for those years appear in this table.

Central Falls Sewage.

(Sample from outlet of the main underdrain of the beds.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	16	Jan.-Dec.	decid.	sl.	turbid., 83	decid. musty and disagreeable	601.	117.	484.	42.6	1.89	1.27	.62	196.	8.7	.260	19.3	....	....	105,600
1908	12	Jan.-Dec.	decid.	sl.	turbid., about 78	decid. disagreeable and musty.	722.	160.	562.	51.3	2.28	1.72	.56	230.	13.6	.630	25.5	....	....	114,000
1909	12	Jan.-Dec.	decid. to v. decid.	v. sl. to sl.	turbid., about 79	decid. disagreeable and musty.	660.	138.	522.	50.1	2.08	1.48	.60	211.	10.0	.430	21.6	....	....	153,000
1910	12	Jan.-Dec.	sl. to decid.	v. sl.	about 80	dist. to decid. musty.	693.	140.	553.	46.5	1.57	1.30	.27	233.	11.3	.350	19.3	....	....	26,000
1911	12	Jan.-Dec.	sl. to decid.	v. sl. to sl.	turbid., 102	dist. to decid. musty.	754.	155.	599.	62.5	1.62	1.34	.28	247.	9.3	.110	21.3	....	....	393,900
1912	7	Jan.-July.	decid.	v. sl. to sl.	about 96	dist. to decid. unpl. and musty.	621.	116.	505.	62.4	1.73	1.60	.13	191.	8.4	.163	23.6	....	....	78,000
1912 Maximum		....	great.	cons.	about 160	decid. musty and unpl.	741.	90. 157.	651. 651.	72.6	2.56	2.40 2.40	.16 .20	270.	18.4	.300	35.2	....	....	210,000
1912 Minimum		....	sl.	v. sl.	turbid., 75	dist. musty.	530.	104. 90.	426. 420.	53.1	1.08	.88 .88	.20 .08	152.	.9	.040	14.4	....	....	400

V. sl.=very slight; sl.=slight; decid.=decided; f.=faint; dist.=distinct; cons.=considerable; unpl.=unpleasant.

During 1912 this sample when subjected to the methylene blue putrescibility test gave results indicating a non-putrescible condition or nearly so. Three of the seven samples held over the required 96 hours. The other four held from 70 to 90 hours.

Narragansett Pier Sewage.

(*Sample from inlet to the septic tank.*)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid.				As Nitrates.	As Nitrites.				
											Total.	In Solution.	In Suspension.							
1911	3	July-Sept.					1,521	1,392	129.	25.7	5.0	1.7	3.3	592.			60.			2,080,000
1912	3	July-Sept.					953.	769.	184.	22.9	5.5	2.4	3.1	317.			53.			2,700,000
1912 Maximum							1,230	1,062 1,062	168. 226.	30.2	6.5	3.1 3.1	3.4 3.9	454.			69.			4,600,000
1912 Minimum							484.	258. 258.	226. 160.	13.4	3.9	1.7	2.2	60.			35.			710,000

Began to examine this sewage in 1911.

Narragansett Pier Sewage.

(Sample from outlet of the septic tank.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Nitrogen.			Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.	Chlorine.	As Nitrates.	As Nitrites.				
1911	3	July-Sept.	.....	.....	.....	.....	1,507	1,447	60	19.8	2.7	1.1	1.6	626	.....	.....	43	.....	.....	760,000
1912	3	July-Sept.	.....	.....	.....	.....	1,160	981	179	20.4	4.7	2.2	2.5	447	.....	.....	42	.....	.....	1,030,000
1912 Maximum	.....	.....	.....	.....	.....	.....	1,890	1,638	252	23.1	6.5	3.0	3.5	780	.....	.....	57	.....	.....	1,400,000
1912 Minimum	.....	.....	.....	.....	.....	.....	258	180	78	16.5	3.5	1.9 1.7	1.6 1.6	66	.....	.....	33	.....	.....	580,000

Pawtucket Sewage.

(Sample of the sewage as received at the purification plant before passing screens.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	24	Jan.-Dec.	.....	.....	.....	.....	1,027	560	467	75.9	16.8	7.9	8.9	100	.....	.....	154	.....	.....	11,000,000
1908	24	Jan.-Dec.	.....	.....	.....	.....	1,329	698	631	89.3	20.4	8.7	11.7	114	.....	.....	257	.....	.....	8,137,000
1909	23	Jan.-Dec.	.....	.....	.....	.....	1,073	622	451	87.2	15.2	7.4	7.8	97	.....	.....	162	.....	.....	5,015,000
1910	24	Jan.-Dec.	.....	.....	.....	.....	1,120	631	489	90.3	18.9	7.9	11.0	123	.....	.....	180	.....	.....	6,840,000
1911	24	Jan.-Dec.	.....	.....	.....	.....	1,091	565	526	85.2	16.3	5.7	10.6	108	.....	.....	159	.....	.....	6,421,000
1912	21	Jan.-Dec.	.....	.....	.....	.....	1,115	661	454	111.6	21.4	7.9	13.5	167	.....	.....	167	.....	.....	5,380,000
1912 Maximum			.....	.....	.....	.....	1,570	944 980	626 724	167.4	30.4	11.0 12.8	19.4 19.6	314	.....	.....	226	.....	.....	13,700,000
1912 Minimum			.....	.....	.....	.....	584	356	228	65.8	11.8	4.2 4.2	7.6 6.2	74	.....	.....	104	.....	.....	4

This sewage as sampled is at times a mixture of the Newell Avenue flow and the West Avenue flow in proportion to the discharge from each, and at times the Newell flow only when this alone is being filtered. During 1912 all samples were Newell Avenue flow.

Pawtucket Sewage.

(Sample of the settled sewage as flowing onto beds.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid.				As Nitrates.	As Nitrites.				
											Total.	In Solution.	In Suspension.							
1907	21	Jan.-Dec.	.....	.....	.....	.....	749	530	189	70.6	11.8	6.6	5.2	86	....	....	116	....	....	10,700,000
1908	21	Jan.-Dec.	.....	.....	.....	.....	904	658	246	75.9	14.1	8.3	5.8	112	....	....	151	....	....	9,767,000
1909	24	Jan.-Dec.	.....	.....	.....	.....	847	605	242	77.7	11.7	6.3	5.4	98	....	....	126	....	....	6,113,000
1910	21	Jan.-Dec.	.....	.....	.....	.....	879	642	237	84.5	13.8	6.6	7.2	123	....	....	139	....	....	6,870,000
1911	21	Jan.-Dec.	.....	.....	.....	.....	769	569	200	78.5	10.9	5.2	5.7	107	....	....	116	....	....	7,127,000
1912	21	Jan.-Nov	.....	.....	.....	.....	883	648	235	103.4	15.8	7.3	8.5	166	....	....	127	....	....	6,203,000
1912 Maximum			.....	.....	.....	.....	1,102	814 852	288 312	153.0	23.8	11.0 11.0	12.8 17.6	272	....	....	196	....	....	26,900,000
1912 Minimum			.....	.....	.....	.....	642	438 438	204 162	80.4	10.2	4.2 4.2	6.0 5.2	75	....	....	84	....	....	9

Pawtucket Sewage.

(*Sample of the effluent from different beds.*)

The samples taken during 1912 were as follows:—one from beds 6 and 8, five from beds 8 and 9, one from bed 10, three from beds 10 and 11, one from bed 12, one from bed 13, five from bed 14, one from bed 15, and two from bed 16.

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Bacteria per c. c.	Bed Number.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.			
1907	26	Jan.-Dec.	sl.	sl.	about 41	dist. musty & disagreeable.	437.	164.	273.	20.2	1.50	1.08	.42	78.	25.0	.720	15.5	273,000	6–16
1908	24	Jan.-Dec.	decid.	v sl.	turbid, about 69	dist. musty.	510.	190.	320.	23.1	2.48	1.81	.67	100.	19.4	.840	27.2	514,000	6–16
1909	24	Jan.-Dec.	decid.	v. sl. to sl.	turbid, about 69	dist. to decid. unpleasant and musty.	461.	137.	324.	31.6	1.99	1.45	.54	96.	12.9	.650	20.1	310,000	6–16
1910	24	Jan.-Dec.	decid.	v. sl.	turbid, about 68	dist. to decid. musty and disagreeable.	486.	146.	340.	31.8	2.15	1.52	.63	108.	14.3	.390	20.7	247,000	6–16
1911	24	Jan.-Dec.	decid.	v. sl.	turbid, about 68	dist. musty and unpl.	452.	138.	314.	30.0	1.88	1.25	.63	99.	12.1	.530	20.3	298,000	5–16
1912	20	Jan.-Dec.	decid.	v. sl.	turbid, about 105	dist. to decid. disagreeable, unpl. and musty.	535.	120.	415.	47.5	2.60	1.87	.73	149.	10.8	.380	25.4	141,500	6–16
1912 Maximum			great	v. cons.	about 240	v decid. disagreeable.	710.	190. 253.	520. 520.	133.7	6.60	5.50 5.50	1.10 3.00	200.	26.6	1.400	59.2	820,000	....
1912 Minimum			v. sl.	none.	40	f. musty.	405.	104. 51.	301. 301.	11.2	.80	.80 .56	.00 .00	87.	.3	.000	9.6	200	....

V. sl.=very slight; sl.=slight; decid.=decided; dist.=distinct; cons.=considerable; unpl.=unpleasant; f.=faint; v. decid.=very decided.

During 1912 this sample when subjected to the methylene blue putrescibility test showed a non-putrescible condition from May until sampling was stopped in November, when the sewage was turned into the Providence system. From January to May the results on this test were very variable, two of them being decolorized in one hour, four ranging from 30 to 60 hours, and one being non-putrescible, holding over the required 96 hours.

Providence Sewage.

(Sample of the crude sewage flow as received at the purification plant at Field's Point.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
*1907	12	Jan.-Dec.					1,480.	1,154.	326.	18.0	7.7	3.8	3.9	351.			114.			2,092,300
*1908	11	Jan.-Dec.					1,359.	1,072.	287.	19.0	7.7	3.8	3.9	341.			123.			1,425,000
*1909	12	Jan.-Dec.					1,940.	1,601.	339.	21.2	7.9	3.7	4.2	565.			127.			2,112,000
*1910	10	Jan.-Dec.					1,797.	1,472.	325.	24.3	10.1	4.8	5.3	506.			136.			2,418,000
*1911	7	Jan.-June					1,987.	1,315.	672.	19.4	12.3	5.4	6.9	360.			198.			1,633,000
†1911	11	July-Dec.					1,656.	1,319.	337.	19.8	7.5	2.6	4.9	461.			105.			10,024,000
†1912	24	Jan.-Dec.					1,272.	951.	321.	17.1	7.4	3.0	4.4	289.			101.			7,827,000
1912 Maximum							1,980.	1,628. 1,628.	352. 416.	23.2	10.4	3.8	6.6	638.			138.			32,000,000
1912 Minimum							826.	642. 638.	184. 184.	12.4	4.4	1.9 1.9	2.5 2.4	101.			74.			50,000

*"Grab" samples. †Twenty-four-hour composite samples.

Providence Sewage.

(Sample of the effluent leaving the purification plant at Field's Point.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
*1907	12	Jan.-Dec.	.....	.....	.....	.....	1,084	1,004	80	16.5	4.3	2.7	1.6	312	.....	.....	52	....	....	7,305,100
*1908	12	Jan.-Dec.	.....	.....	.....	.....	1,174	1,000	74	16.1	4.7	3.2	1.5	353	.....	.....	57	....	....	5,637,000
*1909	12	Jan.-Dec.	.....	.....	.....	.....	1,505	1,412	93	18.0	4.6	3.0	1.6	477	.....	.....	59	....	....	5,038,000
*1910	11	Jan.-Dec.	.....	.....	.....	.....	1,597	1,514	83	22.6	5.3	3.1	2.2	567	.....	.....	52	....	....	5,230,000
*1911	7	Jan.-June	.....	.....	.....	.....	1,163	1,051	112	19.5	5.3	3.6	1.7	309	.....	.....	85	....	....	572,000
†1911	11	July-Dec.	.....	.....	.....	.....	1,548	1,404	144	17.5	5.2	2.9	2.3	474	.....	.....	85	....	....	12,043,000
†1912	24	Jan.-Dec.	.....	.....	.....	.....	1,152	980	172	17.4	5.8	3.0	2.8	297	.....	.....	89	....	....	14,677,000
1912 Maximum	..	.....	.....	.....	.....	.....	1,912	1,692 1,692	220 278	27.4	7.5	3.9 4.1	3.6 4.3	626	.....	.....	118	....	....	63,000,000
1912 Minimum	..	.....	.....	.....	.....	.....	754	626 626	128 94	11.4	4.0	3.0 2.1	1.0 1.0	116	.....	.....	64	....	....	16,000

*"Grab" samples. †Composite samples.

State Sanatorium Sewage.*

(*Sample of the outlet of the septic tank.*)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	5	Oct.-Dec.	.....	.....	....	.....	653	401	252	36.8	7.4	4.7	2.7	43	....	....	68	....	....	11,300,000
1908	25	Jan.-Dec.	.....	.....	....	.....	492	336	156	34.4	5.4	3.4	2.0	37	....	....	58	....	....	4,600,000
1909	14	Jan.-July	.....	.....	....	.....	489	335	154	41.6	5.0	3.3	1.7	37	....	....	55	....	....	2,990,000
1910	18	Mar.-Dec.	.....	.....	....	.....	410	314	96	37.8	4.4	2.6	1.8	37	....	....	40	....	....	2,670,000
1911	18	Jan.-July, Nov.-Dec.	.....	.....	....	.....	346	254	92	30.7	4.0	2.6	1.4	35	....	....	40	....	....	4,300,000
1912	24	Jan.-Dec.	.....	.....	....	.....	293	214	79	25.7	3.7	2.3	1.4	28	....	....	42	....	....	3,732,000
1912 Maximum			.....	.....	....	.....	478	364 364	114 152	35.3	5.3	3.9 3.9	1.4 3.1	86	....	....	55	....	....	32,900,000
1912 Minimum			.....	.....	....	.....	186	144 144	42 38	8.8	2.2	1.4 1.3	.8 .4	18	....	....	26	....	....	1,100

Present series of samples were taken from the new plant and date from October, 1907.

*See page 105.

State Sanatorium Sewage.*

(Sample of the applied spray, being the sewage as applied to the sprinkling filters.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	4	Nov.-Dec.	.....	.....	....	.....	525	397	128	34.6	6.5	4.0	2.5	39	....	....	59	....	....	10,200,000
1908	25	Jan.-Dec.	.....	.....	....	.....	505	346	159	34.4	5.4	3.3	2.1	39	....	....	59	....	....	5,480,000
1909	14	Jan.-July	.....	.....	....	.....	499	330	169	40.5	5.3	3.1	2.2	37	....	....	56	....	....	4,580,000
1910	18	Mar.-Dec.	.....	.....	....	.....	403	304	99	38.9	4.6	2.6	2.0	35	....	....	42	....	....	3,880,000
1911	14	Jan.-May, Nov.-Dec.	.....	.....	....	.....	335	239	96	32.0	4.4	2.7	1.7	35	....	....	40	....	....	3,865,000
1912	23	Jan.-Dec.	.....	.....	....	.....	280	203	77	25.0	3.5	2.0	1.5	26	....	....	39	....	....	3,894,000
1912 Maximum			.....	.....	....	.....	436	338 338	98 116	34.5	5.4	3.1	2.3	80	....	....	55	....	....	33,000,000
1912 Minimum			.....	.....	....	.....	186	140 140	46 36	10.6	2.1	1.4 .8	.7 .5	15	....	....	27	....	....	100

*See page 105.

State Sanatorium Sewage.*

(Sample of the effluent from the sprinkling filters taken at the square well at rear of the filter house.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	4	Nov.-Dec.	great	cons.	turbid	dist. disagreeable (sewage)	643	343	300	23.1	6.6	3.3	3.3	36	.00	3.100	53	....	....	10,400,000
1908	25	Jan.-Dec.	great	cons. to heavy.	turbid.	dist. to decid. unpl. to disagreeable.	467	305	162	23.5	6.1	2.9	3.2	38	.30	.640	49	....	....	5,070,000
1909	13	Jan.-July	great	v. cons.	turbid.	dist. to decid. unpl. to disagreeable.	510	306	204	33.0	7.4	3.1	4.3	36	.20	.485	57	....	....	3,650,000
1910	18	Mar.-Dec.	decid.	v. cons.	turbid.	decid. unpl. to disagreeable.	343	259	84	29.7	4.5	2.0	2.5	34	.10	.180	34	....	....	2,250,000
1911	18	Jan.-July, Nov.-Dec.	decid.	v. cons.	turbid.	dist. unpleasant, disagreeable and musty.	372	243	129	28.5	6.1	1.9	4.2	35	2.80	1.430	46	....	....	3,120,000
1912	24	Jan.-Dec.	v. sl. to sl.	cons. to v. cons.	about 53	dist. unpleasant	229	179	50	21.2	2.9	1.4	1.5	26	.40	.270	26	....	....	1,489,000
1912 Maximum			v. decid.	v. heavy.	turbid, about70	decid. unpleasant.	336	268 268	68 136	32.2	5.4	1.4 2.1	4.0 4.0	58	1.40	1.300	66	....	....	11,000,000
1912 Minimum			none.	sl.	37	f. unpleasant.	130	106 106	24 14	9.6	1.2	.7 .7	.5 .2	17	.00	.000	16	....	....	less than 100

Sl.=slight; decid.=decided; v. decid.=very decided; cons.=considerable; v. cons.=very considerable; dist.=distinct; unpl.=unpleasant. *See page 105.

During 1912, this sample when subjected to the methylene blue putrescibility test held for comparatively short times. One sample held for about 60 hours as against the 96 hours required and the next longest time was 24 hours. A number of the samples held from 3 to 22 hours and seven of them decolorized in one hour.

State Sanatorium Sewage.*

(Sample of the final effluent at edge of woods, after passing settling tank.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor. (Hot.)	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Oxygen Consumed	Hardness.	Alkalinity	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	5	Oct.-Dec.	great	sl.	turbid.	dist. to decid., of sewage.	344	276	68	25.2	4.1	2.6	1.5	33	.00	.000	35	....	....	9,400,000
1908	25	Jan.-Dec.	great	sl.	turbid.	dist. to decid., unpl. to disag.	339	288	51	25.0	4.0	2.8	1.2	40	.10	.100	30	....	....	4,400,000
1909	14	Jan.-July	great	sl.	turbid.	dist. to decid., unpl. to disag.	353	299	54	35.0	4.1	3.1	1.0	37	.00	.030	34	....	....	2,360,000
1910	18	Mar.-Dec.	v. decid.	sl.	turbid.	decid. unpl. to disag.	283	241	42	23.1	2.7	1.9	.8	32	.00	.000	24	....	....	2,110,000
1911	18	Jan.-July, Nov.-Dec.	v. decid.	sl.	turbid.	dist., unpl. and disag. and musty	246	200	46	20.3	2.7	1.7	1.0	30	.10	.050	26	....	....	3,840,000
1912	24	Jan.-Dec.	sl. to decid.	sl. to cons.	about40	dist. unpl.	189	163	26	16.5	2.0	1.3	.7	21	.20	.020	21	....	....	2,406,000
1912 Maximum			v. decid.	v. cons.	turbid. about60	decid. unpl.	284	276 276	8 48	26.0	2.8	1.6 2.0	1.2 1.7	34	1.00	.100	33	....	....	11,200,000
1912 Minimum			v. sl.	v. sl.	20	v. f. unpl.	46	40	6	.420	.380	.240	.140	3.2	.00	.000	4.2	....	....	less than 100

V. sl.=very slight; sl.=slight; decid.=decided; v. decid.=very decided; cons.=considerable; v. cons.=very considerable; dist.=distinct; unpl.=unpleasant; disag.=disagreeable; v. f.=very faint. *See page 105.

During 1912, this sample when subjected to the methylene blue putrescibility test held for comparatively short times. One sample held the required 96 hours, and one for 90 hours. A number of samples held from 5 to 20 hours, two held for from two to three hours, and 13 decolorized in one hour.

Woonsocket Sewage.

(Sample of crude sewage as received at the filter beds through the 36" sewer.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Ammonia				Chlorine.	Nitrogen.		Oxygen Consumed.	Hardness.	Alkalinity.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	In Solution.	In Suspension.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.				
1907	9	Jan.-Dec.					691	411	283	27.1	8.0	3.4	4.6	74			93			5,583,300
1908	11	Jan.-Dec.					717	447	270	28.1	8.0	3.6	4.4	83			96			5,490,000
1909	12	Jan.-Dec.					704	417	287	38.0	8.6	3.8	4.8	86			94			5,410,000
1910	10	Jan.-Dec.					1,161	731	433	39.4	12.0	4.2	7.8	107			135			4,721,000
1911	12	Jan.-Dec.					970	627	313	42.7	11.4	4.3	7.1	94			123			6,831,000
1912	12	Jan.-Dec.					774	482	292	31.7	9.0	3.6	5.4	97			119			4,641,000
1912 Maximum							1,008	548 570	460 510	49.2	12.8	4.8 5.2	8.0 8.0	162			178			12,500,000
1912 Minimum							510	386	124	22.2	5.4	2.4 2.2	3.0 3.0	62			80			155,000

Woonsocket Sewage.

(Sample of the effluent from different beds, three being from No. 2, four from No. 4, two from No. 6, two from No. 8, and one from No 10.)

(Parts per 1,000,000.)

Yearly Average.	No. of Samples.	Date of Collection.	Appearance.			Odor (Hot.)	Residue on Evaporation.			Ammonia				Chlorine.	Nitrogen.		Oxygen Consumed.	Bed Number.	Bacteria per c. c.
			Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.			
1907	10	Jan.-Dec.	decid.	v. sl.	turbid., 29	dist. unpl. and musty	378	141	237	12.6	1.31	.98	.33	62	15.5	1.230	16.2	1-8	401,200
1908	11	Jan.-Dec.	v. decid.	none.	turbid., 41	dist. to decid., unpl. and musty.	324	113	211	10.4	1.49	1.19	.30	65	8.9	.730	17.3	1-10	624,000
1909	11	Jan.-Nov.	v. decid.	none. to v. sl.	turbid., about 40	dist. unpl. and musty.	371	143	228	9.0	1.02	.74	.28	66	15.7	.910	13.3	2-10	95,000
1910	10	Jan.-Dec.	v. decid.	none.	turbid., about 44	dist. unpl. and musty.	379	137	242	13.7	1.74	1.22	.52	73	14.0	1.660	19.5	2-10	178,000
1911	12	Jan.-Dec.	decid. to v.-decid.	none.	turbid., 68	dist. to decid. musty.	335	105	230	15.7	1.42	1.15	.27	71	7.3	.440	19.2	2-10	367,000
1912	12	Jan.-Dec.	decid.	none	turbid., 46	f. to dist. musty and unpl.	386	119	267	14.5	1.39	1.16	.23	82	17.1	.730	17.4	2-10	225,000
1912 Maximum	..	.....	great.	sl.	about 80	decid. musty.	724	266	458	32.4	2.16	2.04	.12	142	64.3	3.600	28.0	....	1,050,000
												2.04	.56						
1912 Minimum	..	.....	none.	none.	23	v. f. unpl.	228	62	166	3.6	.56	.48	.08	50	.3	.000	6.6	....	2,850
								42	166			.48	.04						

V. sl.=very slight; sl.=slight; decid.=decided; v. decid=very decided; v. f.=very faint; f.=faint; dist.=distinct; unpl.=unpleasant.

During 1912, this sample, when subjected to the methylene blue putrescibility test, showed a non-putrescible condition holding over the required 96 hours in the case of seven of the samples. One sample held only 6 to 10 hours, the other four for periods ranging from 18 hours up to 65 hours.

In April the sample could not be obtained at the regular sampling time on acount of the fact that the plant, as is the custom, was out of commission temporarily during cleaning and scraping the beds.

STATE SANATORIUM.

The sewage purification plant originally installed at the time of the opening of the institution, proving, as had been predicted by the Board, to be valueless, the plant was made over into a construction providing for a septic action followed by sprinkler system which sprays the sewage onto filter beds composed of broken stones about the size of stove coal, passing from the beds to retention in a settling tank, finally delivering the treated sewage near a brook which flows southerly into Wilson's Pond, located above the village of Pascoag.

Regular analyses of this sewage in all the various stages of treatment were made with varying results, some of which are not easily explained. In the action of a septic tank it is expected that disintegration of the organic matter will take place with an increase of the anærobic bacteria. In the action of the sprinkling filters the nitrates increase in proportion to the perfect action of the process.

By examination of the tables giving the results of the analyses it will be noted that at certain times the nitrates and nitrites are low, due to ineffective action of the sprinklers or insufficient depth of the filter beds. Varying action in the septic tank may be due to the introduction of disinfectants used in the institution.

Samples were taken at the outlet of the septic tank, as it comes from the sprinklers, from the "square well" which received the sewage after it has passed through the filters, and again as the effluent or treated sewage leaves the plant. The filtered sewage in the settling tank receives waste water direct from the laundries in large quantity without any treatment. This results in a poorer final effluent, with an increase of decomposable material largely starch.

EXAMINATIONS OF PATHOGENIC MATERIAL.

EXAMINATIONS OF SPUTUM.

The examination of specimens of sputum expectorated by persons who are suspected of being afflicted with pulmonary or laryngeal tuberculosis has long been established as a routine method of assistance in making or confirming a diagnosis of the presence of that disease.

The Board introduced this means of assistance to physicians in their daily work in 1894, being the first state board of health to utilize this.

It is understood by those who utilize the test that the finding of the organisms of tuberculosis is of positive value. Also that the absence of the tubercle bacillus in a given specimen of sputum does not signify that the disease tuberculosis is absent.

It can be readily understood that the person affected may have only a small lesion, or that the sputum discharged may be saliva and not coughed up, or that the secretions from the lungs may come from any portion of inflamed surface, or that the organisms present may be held in a mass of thickened tissue and do not happen to escape in this particular specimen at the time of coughing.

When a negative result is found the physician sends in a second specimen for examination, if from the clinical symptoms he continues to believe that tuberculosis is present.

It is assumed that these examinations have a necessary place in the work of a board of health from the fact that, the disease being a communicable one, it is the duty of boards of health to ascertain the presence of all such cases and by warning, prevent those who have the disease from communicating it to others.

The average physician is not, and can not be, properly equipped with the paraphernalia to examine a case which may occur in his

practice only occasionally. He has been fully instructed as to the meaning of the presence or absence of the organism. In many of the schools instruction and actual laboratory practice is given in examining sputum for the organism, but it is impossible for him to carry the staining solutions necessary or to take the time for the examination, and only a very few possess a microscope of sufficiently high power of magnification to distinguish these minute organisms.

The bacteriological laboratory of the State Board of Health, fully equipped with the necessary paraphernalia and with daily experience in examinations, is in a position to give a prompt report as to the result of an examination.

The examination is usually made within twenty-four hours after receiving the specimen, and is reported the following day by mail to the physician having the case in charge. Reports by telephone are not sufficiently reliable for the report of so serious a determination.

A card catalogue record of these results is kept for reference for the department only. The result of an examination is never given upon the request of any person except the physician sending in the specimen or by some person by him authorized to receive the report. It is the purpose of the Board that these reports be protected securely from the curious friend or neighbor. Likewise, a report to the patient himself is refused on the ground that a misinterpretation of the result may follow to the detriment of the patient and danger to the public. If he receives the report that no tubercle bacilli were found, he may assume that the disease is absent and take no further precautions. If he has the report of a positive finding, he may at once assume a line of treatment with quack remedies; he may become despondent and refuse to seek aid of any kind. If he is obliged to ascertain the result from the physician whom he has consulted, an opportunity is offered at least, to give sound advice in the presence of the disease and in case of a negative result with suspicious clinical symptoms, to advise and obtain a second examination of the sputum.

Destructible spit-cups have been furnished free by this department to patients applying for the same, and a large number have availed

themselves of this privilege. During the year 89,450 were distributed. These may be secured at the State House, Providence City Health Department, and from the office of the several anti-tuberculosis associations throughout the State.

In addition to the card catalogue maintained to record the results of examination of sputum, a similar catalogue of all the deaths which are the result of tuberculosis of all forms is preserved for reference. The deaths have been thus recorded since 1890, and are a source of study to those interested in the subject.

The association of T. B. +, or the finding of tubercle bacilli in a specimen of sputum from a certain person, is followed perhaps in a few months or a year by the record of his death, on a blue card. The cases are also recorded by residence.

Many cases will occur in sequence in the same family, frequently at the same address. Often several cases will occur in subsequent months or years at the same residence address, but with different names and different families. This permits of study as to whether the premises may be considered as infected, or whether the unsanitary surroundings and lack of fresh air and sunlight may be the causative factor, or whether the persons who are in reduced circumstances, lacking the necessities of life, may not have acquired the disease abroad and that these certain tenements may be the only refuge they may have.

It requires much patient investigation of many years' records and personal consideration of the cases to admit of satisfactory deductions, but a record of this kind will after several years be of service as a basis for such investigation.

Results of Examinations of Sputum for Tuberculosis from January 1, 1912 to January 1, 1913.

Clinical Diagnosis.	Total.	T. B. present.	T. B. absent.	Past cases of T. B. in family.	At present cases of T. B. in family.
Bronchitis	160	19	141	19	9
Bronchitis, Chronic	242	52	190	32	1
Pulmonary Tuberculosis	1,158	342	816	202	60
No diagnosis. Susp. T. B	185	45	140	28	8
Tuberculous Laryngitis	32	12	20	5	.....
Tuberculous Peritonitis	1	.....	1	.....	.....
Hemoptysis	2	1	1	.....	.....
Abscess of Lung	1	.....	1	.....	.....
Asthma	29	2	27	5	.....
Pleurisy	55	7	48	9	1
Empyema	1	1	.....	.....	.....
Pneumonia	23	2	21	4	.....
Influenza	3	1	2	.....	.....
Pharyngitis	5	.....	5	3	.....
Exopthalmic Goitre	1	.....	1	1	.....
Typhoid Fever	2	1	1	.....	.....
Suppuration of Middle Ear	1	.....	1	1	.....
Whooping Cough	3	.....	3	.....	.....
Ulcer Stomach	1	.....	1	.....	.....
Malarial Fever	1	.....	1	.....	.....
Articular Rheumatism	1	.....	1	.....	.....
General Debility	1	.....	1	.....	.....
Total Examinations	1,908	485	1,423	309	79

During the year there were 1,908 specimens of sputum submitted for examination, with the supposition on the part of the attending physician that tuberculosis might be a factor in the causation of the symptoms of the patient.

Of these cases, in 1,158 the clinical symptoms present were sufficiently distinctive to lead the physicians to believe that tuberculosis

of the *lungs* was present. In 342 of those cases the examination of the specimen of sputum showed the presence, in greater or lesser quantity, of tubercle bacilli. This would make 29.5 per cent. of cases where the clinical diagnosis coincided with the bacterial findings, while in 816 cases, or 70.5 per cent. the bacilli of this disease were not found. While this negative result is of value, yet it does not carry the weight of a distinct positive, as to the actual presence of the disease, for it is possible to obtain from the patient a specimen of sputum which is composed of only the saliva and secretions from the larynx, and containing none from the air passages in the lungs. The organisms may also be present at times, in the lung, either lying dormant or encapsulated, and will not be discharged into the air passages, and become a part of the suptum, until a degenerative process is set up which breaks down the tissues surrounding the organisms and sets them free.

In the 32 cases of laryngeal tuberculosis, 12 were positive. The application of this method of diagnosis is especially valuable in this form of the disease, inasmuch as the appearence of the larynx may show the presence of ulcerative processes, and the formation of tubercles from other causes.

In 55 cases the diagnosis was pleurisy and 7 gave a positive result. It is of especial value in these cases, for the organism may not as yet have invaded the lung tissue, but if the cases are neglected, they may readily be carried to the lung or intestine, and there propagate the disease.

It is of interest to note that of 402 cases of acute and chronic bronchitis, in 71 cases the diagnosis was erroneous, and the presence of tuberculosis was established in the bronchi, or in the lungs. The constitution of the patient, however, being sufficiently strong, as yet, to prevent the invasion of the organisms into large areas, the symptoms present were not sufficiently distinct or alarming, to warn the physician of the dangerous element which was present. In 46 instances, where the diagnosis of bronchitis was made, there had been past cases of tuberculosis in the family.

In the following table is presented the number of samples examined for each of the past thirteen years, separating the same into positive and negative results:

Year.	Total.	T. B. +	T. B.—
1900	654	303	351
1901	720	327	393
1902	623	269	354
1903	739	337	402
1904	754	334	420
1905	822	365	457
1906	1,167	439	728
1907	1,540	461	1,079
1908	1,831	562	1,269
1909	1,982	589	1,393
1910	1,907	546	1,361
1911	1,985	524	1,461
1912	1,908	485	1,423

EXAMINATION OF CULTURES IN CASES OF SUSPECTED DIPHTHERIA.

The examination of diphtheria cultures has been continued. This procedure has been utilized as an assistance in determining the presence or absence of the Klebs Leoffler bacillus, the bacterium causing diphtheria. This branch of the laboratory work was commenced in 1894, the Rhode Island State Board of Health being the first state board to carry on this work, following a month or two of its adoption by the city of New York.

The material used for the test or examination consists of the secretions, mucous and cells, found in the back of the throat. This is removed by means of a sterilized cotton swab, which is supplied in the diphtheria culture outfits. The material secured on the swab is smeared on a nutrient sterilized jelly made of hardened blood serum and beef bouillon and supplied with the swab in the outfit.

The whole outfit is delivered by the physicians at certain stations, where an incubator is kept at 37° C. or 98.6° F. The resulting growth or culture on the surface of the media is well grown or developed in from eight to twelve hours. These growths are examined at the bacteriological laboratory in the State House every morning in the year, and a report made *at once* by telephone to the physician who has presented the "culture" for examination.

This procedure enables the physician to verify his clinical diagnosis of the presence of diphtheria in the throat of his patient by showing the positive presence of the Klebs Leoffler bacillus, or, on the other hand, by the absence of the organism, confirms his diagnosis of pharyngitis or tonsilitis.

In many instances a positive laboratory finding when the patient presents clinical symptoms which are negative for dipthheria has enabled the physician to foresee and forestall by treatment the growth of the diphtheria organisms present and thus prevent the formation of toxins which act upon the system. The clinical symptoms may not have developed sufficiently to be diagnostic, and the test enables the physician to be prepared for any sudden symptoms of depression in the patient. It also places him on his guard against the spread of the disease to other members of the family. These persons may be more susceptible to the toxic influences of the organisms than the patient who presents the disease in so mild a form as to occasion little discomfort or distinctive clinical symptoms.

He may also avail himself of the advantages of protection of the rest of the family by immunizing them against the development of the disease if, as is often the case, the organisms are transmitted from the throat of the patient to them.

By thus being forewarned the physician is prepared to meet the serious symptoms of the disease and to check the action and growth of the organism by the administration of anti-diphtheritic toxin or diphtheria antitoxin. This product has been supplied by the State Health Department free, to those unable to pay for it, since its

introduction to the profession. During 1912 a total of 2,800 packages of 2,000 units each was given out by this department.

The State was early in its belief that the protection of other members of the community from the individual case of a communicable disease was justifiable and was the first state to make this prophylactic provision.

As the State as a whole is protected in this way, it assumes the expense of the protection. In thus utilizing the State's money it was believed that the public was protecting itself against the spread of the disease by checking it in the individual.

If the individual having the disease was unable to protect himself against others, it was proper that the State protect its taxpayers, as it would in the isolation and sustenance of persons having smallpox.

During the year 1912 a total of 2,013 cultures were examined for the presence of diphtheria. Of these, 1,754 were primary cultures. Of this number the Klebs Loeffler bacillus of diphtheria was found in 315 cases, 52 of these showing a pure, unmixed culture of Klebs Loeffler, and 263 a mixture with micrococci and streptococci. The bacilli were absent in 1,395 cases. In 44 cultures the examination showed either contamination or no growth.

There were also examined 259 secondary cultures which were largely those taken in connection with the question of release from quarantine. Of these, 55 showed the presence of the Klebs Loeffler bacillus and 199 were negative. In the secondary cultures there were 5 cases in which the examination showed no growth.

The above figures are shown in tabular form in the following:

Examinations of Throat Cultures for Diphtheria during the Year 1912.

	Cultures examined.	K. L. present.	K. L. pure.	K. L. with Mic.	K. L. absent.*
Primary	1,754	315	52	263	1,439
Secondary	259	55	.....	.....	204
Total for year	2,013	370	.....	.....	1,643

*Includes "Contamination" and "No Growth" cultures.

In the following table is presented the total number of cultures examined for the past 6 years, subdivided into positive and negative groups and these also into primary and secondary cultures:

Year.	Total Examined.	Positive.			Negative.			"Contamination" and "No Growth."	
		Total.	Primary.	Secondary.	*Total.	*Primary.	*Secondary.	Primary.	Secondary.
1907	1,561	180	344	136	1,058	891	161	13	13
1908	2,108	751	631	123	1,354	1,113	241	61	12
1909	1,673	551	490	61	1,272	1,122	150	39	6
1910	1,612	304	275	29	1,308	1,189	119	30	1
1911	1,330	725	605	120	1,693	1,150	243	14	0
1912	1,961	370	315	55	1,594	1,395	199	44	5

*Includes "Contamination" and "No Growth" cultures.

EXAMINATIONS FOR THE WIDAL REACTION IN CASES OF SUSPECTED TYPHOID FEVER.

The discovery by Widal that persons who had been affected with typhoid fever for a certain period of time developed within the system a certain toxic product which had the power of checking the life of the true typhoid bacillus grown outside of the body, has been utilized by the Board, as has been done in other states and certain cities.

This reaction is obtained by securing from the ear or the tip of the finger of the patient a single drop of blood. The serum of this blood, when mixed in certain proportions of strength with a large quantity of the living typhoid bacilli, causes the live organisms to grow sluggish in their motile action and finally to unite with others in the same mixture, producing a massing or clumping of the organisms.

This reaction may take place in from twenty to ninety minutes, according to the strength of the toxic or antitoxic material in the blood serum tested.

The organisms which are subjected to the test must be at least twenty-four hours old, and not older. This necessitates the planting and growing of a fresh culture every twenty-four hours. To accomplish this, nutrient media of blood serum or agar-agar must be kept on hand to continue the growth of the culture for stock purposes. From this stock growth, the amount of organisms which may be gathered upon the tip of a needle is introduced into a nutrient media of beef broth or bouillon and there grown for the twenty-four hours.

As these facilities and all the paraphernalia necessary to make this test are not available to the average physician, it is necessary for some central laboratory to undertake this work.

As typhoid fever is a communicable disease, it is the duty of all state and municipal boards of health to aid the physician in such cases as far as possible by determining for him the presence of the disease, the public as a whole receiving the benefit of an early confirmation of diagnosis, resulting in the better care of the patient and proper disposal of his excreta.

To facilitate the offer of the Board to make this test for physicians, typhoid "outfits" are placed at all the depositories where diphtheria culture tubes and sputum outfits may be obtained.

This outfit consists of a card upon which the history of the case may be entered, the name of the physician, etc. The card used is slightly calendered having a non-absorbing surface. A space one

inch square is printed lined off in the upper right corner of the card. This can readily be placed in contact with the drop of blood as it escapes from the incision or puncture made in the lobe of the ear, or in the tip of the finger. The blot or clot of blood secured in this way is easy of transportation, does not have blood corpuscles mixed with the dissolved serum when examined and does not flake off as has been possible from a metallic surface like aluminum or from a glass slide. A three-cornered glover's needle for puncturing the skin is also included in the outfit.

A report of the result can usually be given to the physician, by telephone, on the morning following the day upon which the sample is received. This report is confirmed by mail at the same time that there may be no misunderstanding.

As a result of this offer of assistance, physicians availed themselves in many positive cases, and in many cases in which they were somewhat in doubt, as is shown by the following table:

Positive Widal Reactions	273
Negative Widal Reactions	494
Unsatisfactory Results	39
Total	806

In the following table is shown the number of examinations made for the Widal reaction during the 6 years, 1907 to 1912, together with the results:

Year.	Total.	Positive.	Negative.	Unsatisfactory.
1907	319	85	231	3
1908	561	195	365	1
1909	525	132	391	2
1910	584	162	416	6
1911	771	282	453	36
1912	806	273	494	39

REPORT OF CONTAGIOUS DISEASES DURING THE YEAR 1912.

For the purpose of ascertaining the comparative prevalence of the more common communicable diseases, the health officers of the several towns are requested to report monthly to the State Board of Health all cases of diphtheria, scarlet fever, typhoid fever, measles and other communicable diseases which may have occurred during the month previous. The health officers are supplied with return addressed postals for this purpose and the postals are forwarded to them each month as a reminder.

Many of them report regularly. Others do not report, as they have no record of cases. The physicians in many towns, although aware of the existence of ordinances requiring the reporting of contagious and infectious diseases, do not report the cases occurring in their practice to the health officer. This is because, in the first place they have so few cases that they postpone the report until it is already known to the town people and to the health officer by town rumor. In some cases the physicians object to reporting to a health officer who is not a physician. In several towns the health officer is merely a nuisance inspector and may be engaged in the occupation of a grocer, plumber, or undertaker.

As no result or benefit will accrue from reporting the case under these conditions, it appears useless to the doctor to report. No inspection will be made, no placard placed, no instructions or precautions will be given by some of these unprofessional appointees. In fact, the physician, in the presence of an epidemic, is more apt to report to the Secretary of the State Board of Health. If advised to report to the local health officer, that he may immediately compare these cases with others reported, the question is asked if there is any health officer, and who he is.

Some physicians object to having a mechanic or town sergeant, with no knowledge of sanitation, call upon the family in connection with their cases as they do not believe that any additional sanitary directions can be given than those which they have already given to the family.

The proportion of cases reported and those neglected are about the same each year. However, the figures as tabulated are more accurate, beginning with 1904, but from year to year those reported serve as a fair comparison.

By observation of the following tables it will be noted that in 1912 there were 1,240 cases of diphtheria reported, which is 500 above the average. While the city of Providence contributed a large number of these cases, yet other cities and many of the towns shared in this increased prevalence of diphtheria.

In 1912 there were reported 978 cases of scarlet fever, which is slightly in excess of the average.

Typhoid fever prevailed to the number of 293 cases reported, being about the same number as the average for a number of years.

There were reported 826 cases of measles in 1912, not an unusual number. There were undoubtedly many more cases of measles. Many cities and towns do not desire the report of this disease, and many cases occur in families where no physician is called in attendance.

The prevalence of these diseases during one year more than another does not give the significance that would appear at first sight. It permits of comparison of the number of cases with other prevailing conditions, such as season, climatic conditions, etc. By such comparison it permits of the deduction that the spread of the disease may be dependent upon local conditions or upon association of individuals; thus the difference in season may be only because individuals are more closely brought in contact with each other, as the schools are open during winter months only. In the summer months the individual is prone to travel, and through coming in contact with the dejections of many individuals at country farms and watering places,

through transmission by flies and other insects, or by contaminated drinking water, becomes infected with typhoid fever.

All the figures in this connection go to emphasize the fact that the prevalence of these diseases means individual and direct contact of the person with the disease in another, sometimes in a milder form, or with the excreta or secretions from an original case. The deductions made in the report of the Superintendent of Health of the city of Providence for many years give a precise study of the influence of these latter conditions.

Diphtheria for 1912.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Barrington	1	0	2	0	0	0	1	1	1	0	0	2	8
Bristol	0	0	1	0	0	6	4	0	2	9	12	7	41
Warren	0	1	4	2	0	0	0	1	0	4	6	3	21
Coventry	0	0	0	1	0	0	0	1	2	1	0	1	6
East Greenwich	....	....	....	....	....	....	2	....	0	....	1	....	3
*West Greenwich	....	....	....	....	....	....	....	....	....	....	....	....	.....
Warwick	4	2	1	3	2	1	2	2	1	1	2	0	21
Jamestown	....	....	....	....	....	....	....	....	....	....	....	....	.....
Little Compton	0	0	0	0	0	0	0	0	0	0	0	0	0
Middletown	0	0	0	....	....	....	0	0	0	0	0	0	0
Newport	7	7	2	4	6	3	13	11	3	32	8	15	111
New Shoreham	0	0	0	0	0	0	0	0	0	0	0	0	0
Portsmouth	0	1	0	0	0	0	0	0	0	0	1	0	2
Tiverton	0	2	0	0	0	0	1	0	0	3	0	0	6
Burrillville	1	0	0	0	0	0	0	0	0	0	0	2	3
Central Falls	9	2	1	1	1	2	1	9	4	8	5	4	47
Cranston	2	....	2	2	3	....	1	0	2	4	4	6	26
Cumberland	1	1	0	1	1	0	0	1	4	5	3	1	18
East Providence	5	1	0	1	0	1	2	1	2	1	8	5	27
Foster	0	....	0	....	1	....	....	....	....	....	....	....	1
Glocester	0	0	0	0	0	0	0	0	0	0	0	0	0
Johnston	0	2	0	0	1	0	0	1	1	0	0	0	5
Lincoln	2	0	0	1	3	0	1	0	2	2	4	3	18
North Providence	1	0	0	0	0	0	0	1	1	0	0	0	3
North Smithfield	1	0	2	0	0	0	0	0	0	0	0	0	3
Pawtucket	7	1	11	3	8	9	5	4	12	23	21	17	121
Providence	64	73	53	18	57	42	31	50	31	71	121	67	708
Scituate	....	....	....	....	0	0	0	0	0	0	0	0	0
Smithfield	0	0	0	0	0	2	1	0	0	0	0	0	3
Woonsocket	1	3	5	2	1	0	1	3	2	3	3	2	26
Charlestown	0	1	0	0	0	0	0	0	0	0	0	0	1
Exeter	....	0	0	0	0	0	0	0	0	0	0	0	0
Hopkinton	0	0	0	0	0	2	0	0	1	0	0	0	3
Narragansett	1	0	0	0	0	0	0	0	0	2	0	0	3
North Kingstown	0	0	0	0	0	0	0	0	0	0	0	0	0
Richmond	0	0	0	0	0	0	0	0	0	0	0	0	0
South Kingstown	....	0	1	....	....	....	....	2	....	1	1	....	5
Westerly	0	0	0	0	0	....	0	0	0	0	....	....	0
Total	107	97	85	69	84	68	66	88	71	170	200	135	1,240

*Has no health officer.

Scarlet Fever for 1912.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Barrington	0	2	0	0	0	0	0	0	1	0	1	0	4
Bristol	0	0	0	3	2	1	0	0	0	1	0	0	7
Warren	7	15	2	1	0	0	1	0	0	0	1	0	27
Coventry	6	2	2	2	0	1	2	1	0	0	0	0	16
East Greenwich	...	...	...	...	...	...	0	...	0	...	0	...	0
*West Greenwich	...	...	...	...	...	...	...	...	...	...	...	...	...
Warwick	3	4	6	4	6	1	4	0	1	1	1	2	33
Jamestown	...	...	...	...	...	...	...	...	...	...	...	...	...
Little Crompton	0	0	0	0	0	0	0	1	0	0	0	1	2
Middletown	0	1	0	...	...	...	9	0	1	0	0	0	11
Newport	13	7	18	14	9	5	2	5	4	10	5	13	105
New Shoreham	0	0	0	0	0	0	0	0	0	0	0	0	0
Portsmouth	0	1	2	1	0	0	0	0	0	2	0	0	6
Tiverton	0	0	0	0	0	0	0	0	0	0	0	0	0
Burrillville	2	0	0	0	1	0	0	0	0	0	0	4	7
Central Falls	0	1	1	1	2	1	0	0	0	0	1	0	7
Cranston	3	...	3	4	3	...	3	2	0	2	0	6	26
Cumberland	0	0	3	3	0	0	1	1	0	2	1	7	18
East Providence	3	2	3	3	2	1	0	4	5	5	6	6	40
Foster	0	...	0	...	0	...	...	...	...	...	...	...	0
Glocester	0	0	0	0	0	0	0	0	0	0	0	0	0
Johnston	0	0	3	1	0	2	0	0	0	0	0	0	6
Lincoln	0	0	0	0	0	0	0	1	0	0	0	1	2
North Providence	0	0	0	0	0	0	0	6	4	4	1	0	15
North Smithfield	0	0	0	0	0	0	0	0	1	0	0	0	1
Pawtucket	2	4	3	7	4	3	0	0	1	2	1	7	34
Providence	48	41	57	49	79	82	22	38	27	46	45	53	587
Scituate	...	...	...	...	0	0	0	0	0	0	0	0	0
Smithfield	2	1	2	0	0	0	0	0	0	0	0	5	10
Woonsocket	0	0	1	0	0	0	0	0	0	0	0	1	2
Charlestown	0	0	0	1	0	0	0	0	0	0	0	0	1
Exeter	...	0	0	0	0	0	0	0	0	0	0	0	0
Hopkinton	0	0	0	0	0	0	0	0	0	0	0	0	0
Narragansett	0	0	0	0	0	0	0	0	0	0	0	9	0
North Kingstown	1	1	0	1	0	0	0	0	0	0	0	0	3
Richmond	1	1	0	1	1	0	0	0	2	0	0	0	6
South Kingstown	...	0	0	...	...	...	...	0	...	2	0	...	2
Westerly	0	0	0	0	0	...	0	0	0	0	...	...	0
Total	91	83	106	96	109	97	44	59	47	77	63	106	978

*Has no health officer.

Typhoid Fever for 1912.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Barrington	0	0	0	0	0	0	0	0	0	0	0	0	0
Bristol	0	0	0	0	0	3	0	0	0	0	0	0	3
Warren	1	0	0	0	0	0	0	1	0	0	0	0	2
Coventry	0	0	0	0	0	0	0	0	0	0	0	0	0
East Greenwich	....	....	....	....	....	....	0	....	1	....	0	....	1
*West Greenwich	....	....	....	....	....	....	....	....	....	....	....	....	....
Warwick	0	0	0	0	0	0	0	0	22	0	0	5	27
Jamestown	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Compton	0	0	0	0	0	0	0	0	0	0	0	0	0
Middletown	0	0	0	....	....	....	0	0	0	0	0	0	0
Newport	1	1	0	0	0	1	2	3	3	2	7	1	21
New Shoreham	0	0	0	0	0	0	0	0	0	0	0	0	0
Portsmouth	0	0	0	0	0	0	0	0	0	0	0	0	0
Tiverton	2	0	1	0	0	0	0	0	0	0	0	0	3
Burrillville	0	0	0	0	0	0	1	0	0	0	0	1	2
Central Falls	0	0	0	0	0	0	0	2	0	1	1	0	4
Cranston	0	....	1	0	0	....	0	1	8	3	1	0	14
Cumberland	0	0	0	0	2	0	0	0	1	0	0	0	3
East Providence	0	0	0	0	0	0	0	0	0	0	0	0	0
Foster	0	....	0	....	0	....	....	....	....	....	....	....	0
Glocester	0	0	0	0	0	0	0	0	0	0	0	0	0
Johnston	0	0	0	0	0	0	0	0	0	0	0	0	0
Lincoln	0	0	0	0	0	0	0	7	0	0	0	0	7
North Providence	0	0	1	0	0	0	0	1	3	0	0	0	5
North Smithfield	0	0	0	0	0	0	0	0	0	0	0	0	0
Pawtucket	0	3	0	0	1	1	1	3	1	0	1	0	11
Providence	3	3	11	8	8	8	20	32	39	31	15	5	183
Scituate	....	....	....	....	0	0	0	0	0	0	0	1	1
Smithfield	0	0	0	0	0	0	0	0	0	0	0	0	0
Woonsocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Charlestown	0	0	0	0	0	0	0	0	0	0	0	0	0
Exeter	....	0	0	0	0	0	0	0	0	0	0	0	0
Hopkinton	0	0	0	0	0	0	0	0	0	0	0	0	0
Narragansett	0	0	0	0	0	0	0	0	0	0	0	0	0
North Kingstown	0	0	0	0	1	0	0	1	1	0	0	0	3
Richmond	0	0	0	0	0	0	0	0	0	0	0	0	0
South Kingstown	....	1	0	....	....	....	....	1	....	0	0	....	2
Westerly	0	0	0	0	0	....	1	0	0	0	....	....	1
Total	7	8	11	8	12	13	25	52	79	37	25	13	293

*Has no health officer.

Measles for 1912.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Barrington	0	0	0	0	2	0	0	0	0	0	0	0	2
Bristol	0	0	0	0	0	0	0	0	0	0	0	0	0
Warren	1	1	3	1	0	0	0	0	0	0	0	0	6
Coventry	0	0	0	0	0	0	0	0	0	0	0	0	0
East Greenwich	....	....	....	....	....	....	0	....	0	....	0	....	0
*West Greenwich	....	....	....	....	....	....	....	....	....	....	....	....	.....
Warwick	0	0	0	0	0	0	0	0	0	0	0	0	0
Jamestown	....	....	....	....	....	....	....	....	....	....	....	....	.....
Little Compton	0	0	0	0	0	0	0	0	0	0	0	0	0
Middletown	1	0	0	....	....	....	0	0	0	0	0	0	1
Newport	8	4	0	3	10	14	5	2	0	1	0	0	47
New Shoreham	14	8	0	0	0	0	0	0	0	0	0	0	22
Portsmouth	0	0	0	27	31	0	0	0	0	0	0	0	58
Tiverton	0	0	1	0	0	1	0	0	0	0	0	0	2
Burrillville	0	0	0	0	0	0	0	0	0	0	0	1	1
Central Falls	0	0	0	3	2	0	0	0	0	12	24	22	63
Cranston	4	....	12	7	12	....	0	0	0	0	1	4	40
Cumberland	0	0	0	0	0	1	0	0	0	0	0	0	1
East Providence	0	0	0	0	0	0	0	0	0	0	0	0	0
Foster	0	....	0	....	0	....	....	....	....	....	....	....	0
Glocester	0	4	0	0	0	0	0	0	0	0	0	0	4
Johnston	0	0	0	0	0	0	0	0	0	0	0	0	0
Lincoln	2	0	0	3	1	0	0	0	0	0	0	0	6
North Providence	0	0	0	0	0	0	0	0	0	0	0	0	0
North Smithfield	0	0	0	9	0	0	0	0	0	3	2	1	15
Pawtucket	1	3	1	2	3	0	4	0	0	0	1	0	15
Providence	36	39	140	141	70	29	8	2	0	1	12	14	492
Scituate	....	....	....	....	0	0	0	0	0	0	0	0	0
Smithfield	0	0	0	0	0	0	0	0	0	0	0	0	0
Woonsocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Charlestown	0	0	0	3	15	0	0	0	0	0	0	0	18
Exeter	....	0	0	0	0	0	0	0	0	0	0	0	0
Hopkinton	0	0	0	0	0	0	0	0	0	0	1	0	1
Narragansett	0	0	5	0	0	0	0	0	0	0	0	0	5
North Kingstown	3	4	0	†	0	0	0	0	0	0	0	0	7
Richmond	0	0	0	0	0	0	0	0	0	0	0	0	0
South Kingstown	....	20	0	....	....	....	....	0	....	0	0	....	20
Westerly	0	0	0	0	0	....	0	0	0	0	....	....	0
Total	70	83	162	199	146	45	17	4	0	17	41	42	826

*Has no health officer †German measles prevalent.

BIRTHS, DEATHS, AND MARRIAGES, 1911.

The value of reliable reports in their various bearings, relating to the records of births, marriages, and deaths, and the items of fact connected therewith, showing the vital movements of the population from year to year, has been so frequently presented in the previous reports of this Board as to need no repetition at this time. It is gratifying, however, to be able to state that with no exception, persons eminent in social and political science everywhere recognize the indispensable information such reports furnish, and that in every civilized country they occupy places of importance in the government reports second to no other department.

The work of collecting the data for the fifty-ninth report (1911), the enumerating, classifying, arranging, and collecting in tables for the purpose of presenting the various facts in such detail as to facilitate examination and study, has been in progress during the time of making up this report and affords some facts which may be presented at this time.

Below will be found some of the general results of the registry of births, marriages, and deaths during 1911:

BIRTHS.

SEX.		PARENT NATIVITY.	
Males	6,988	Native*	5,156
Females	6,515	Foreign	8,347
Whole number of births	13,503		

MARRIAGES.

Native born Groom and Bride	1,927
Foreign born Groom and Bride	1,607
Native Groom and Foreign Bride	437
Foreign Groom and Native Bride	535
Whole number of marriages	4,506

Native Grooms	2,364	Foreign Grooms	2,142

*Including all whose fathers were born in the United States, whether the fathers were of foreign or native parentage.

DEATHS.

SEX.		NATIVITY.	
Males	4,544	Native	5,707
Females	4,113	Foreign	2,950
Whole number of deaths	8,657		

PROPORTION OF BIRTHS, MARRIAGES, AND DEATHS TO POPULATION, AND RATIOS PER 1,000 OF POPULATION IN 1911.

There was one birth to every 41.1 of population, or	24.3 births in every 1,000
One person married in every 61.6 of population, or	16.2 persons married in every 1,000
And one death in every 64.1 of population, or	15.6 deaths in every 1,000
Population in 1911 was (estimated)	555,116

The following Summary will show the rates, per 1,000 of the populatian, of births, marriages, and deaths for twenty-three years.

	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911
Birth-rates	24.1	24.7	26.5	25.2	26.5	26.6	25.7	27.3	26.8	25.9	25.6	25.9	25.8	25.1	25.3	25.8	25.6	25.9	26.3	26.0	24.3	24.6	24.3
Death-rates	19.0	20.1	18.6	20.1	19.6	19.5	19.6	19.1	17.6	16.7	17.6	20.6	18.2	17.8	18.5	17.3	17.1	17.6	18.0	16.2	15.6	17.1	15.6
Excess of birth-rates over death-rates	5.1	4.6	7.9	5.1	6.9	7.1	6.1	8.2	9.2	9.2	8.0	5.3	7.6	7.3	6.8	8.5	8.5	8.3	8.3	9.8	8.7	7.5	8.7
Marriage-rates (persons)	18.4	18.5	18.7	19.1	18.7	17.4	18.2	17.0	15.6	15.8	16.2	18.4	17.6	18.5	19.2	17.8	19.9	20.9	22.5	19.3	20.6	16.8	16 2
Ratio of number of marriages	9.2	9.3	9.3	9.6	9.4	8.7	9.1	8.5	7.8	7.9	8.1	9.2	8.8	9.3	9.6	8.9	9.9	10.4	11.2	9.1	10.3	8.4	8.1

The following table will present the number, parentage, and proportion to total mortality of deaths from several of the most prominent causes of death, in their order of precedence for 1911:

	Whole No. of deaths.	Percentage of deaths from all causes.	Parentage. Native.	Foreign	Excess of Foreign over Native.
Tuberculous Diseases	951	10.99	262	689	427
Heart Diseases	911	10.52	355	556	201
Pneumonia	868	10.03	290	578	288
Kidney Diseases	691	7.98	277	414	137
Apoplexy and Cerebral Hemorrhage	542	6.26	249	293	44
Cancer	486	5.61	193	293	100
Cholera Infantum*	474	5.48	145	329	184
Accidents	458	5.29	145	313	168
Old Age	161	1.86	87	74	—13
Bronchitis	148	1.72	46	102	56
Brain Diseases	144	1.66	49	95	46
Diphtheria	138	1.60	59	79	20
Pertussis	127	1.47	38	89	51
Liver Diseases	124	1.43	36	88	52
Diabetes	115	1.33	47	68	21
Enteritis†	79	91	25	54	29
Appendicitis	70	.81	23	47	24
Alcoholism	66	.76	21	45	24
Suicides	64	.74	27	37	10
Scarlet Fever	56	.65	21	35	14
Typhoid Fever	51	.59	13	38	25
Influenza	39	.45	20	19	—1
Rheumatism	34	.39	11	23	12

LONGEVITY OF DECEDENTS.

	1906.	1907.	1908.	1909.	1910	1911.
Average age in years of Male decedents	34.60	35.66	36.12	36.30	35 03	38.58
Average age in years of Female decedents	37.06	39 98	39 28	39.82	38.30	40.98
Average age in years of All decedents	35.80	37.73	37.61	38.03	36 59	39 72

There has been a gradual increase during the last fifty years in the average length of life of decedents; taking five-year periods the figures increase from twenty-nine and thirty-two one-hundredths years, for the period from 1861-1865, to thirty-six and seventy-six one-hundredths years for the period from 1906-1910.

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*Includes Diarrhea diseases under 2 years.

†Includes Diarrheal diseases over 2 years.

RATIOS OF MORTALITY.

There has been the usual variation in the amount of mortality from the more important diseases. Cancer, as a cause, has increased very slightly as compared with the year before. There was a decrease of thirty-one deaths from tuberculosis from the previous year, and the percentage to the whole number of deaths has noticeably decreased.

There were three less deaths from diseases of the heart in 1911 than in the previous year. Diseases of the heart are often associated with disease of the kidneys, and the physician signing the death return may give prominence to one of these as a primary cause, since this may be uppermost in his mind. It may be at times that the presence of disease of the kidneys, as shown by the physical signs, may be more readily ascertained than pathological changes in an examination of the heart. Often both causes are given, and as statisticians have not agreed upon a selection of either as of the major importance, the compiler may unwittingly lean to a preference. During 1911 there were 691 deaths from diseases of the kidneys, which is larger by 25 than the number in 1910.

The micro-organisms producing influenza, or the specific organisms causative of the infectious diseases, are carried to different parts of the system and lodging there may produce inflammatory symptoms in that locality. This condition may not be distinguishable from some disease commonly found in that particular organ invaded by these organisms. When the lung is invaded we may have a "congestive pneumonia," but the specific pneumococcus of true lobar pneumonia is not present. The pulmonary symptoms being the most prominent, the physician may give the cause of death as pneumonia. Also, an active inflammation of the lungs may supervene in the presence of tuberculosis of the lungs and the physician may not distinguish the relation of the symptoms to each other. This may in part account for the 996 deaths classed as pneumonia in 1905, which was the largest number ever recorded in the state. In 1911 there were but 39 deaths recorded from influenza.

In 1911 there were 34 more deaths from scarlet fever than during the previous year.

Smallpox, which had spread throughout the State in 1902, causing 35 deaths, had abated in the actual number of cases and the number of deaths had fallen to only 3 in 1903, since which year no deaths from this cause have been recorded, a period of nine years.

The following figures give a more detailed comparison of the number of deaths from a number of diseases:

Apoplexy and Cerebral Hemorrhage. — There were 7 more deaths from apoplexy in 1911 than in 1910. The number of deaths, taken in five-year periods from these causes has been increasing for the past forty-five years; the last two periods, however, were practically the same. The percentage of the whole number is not materially changed for the last twenty-five years.

Bronchitis.—There was a decrease of 36 from the number of deaths from bronchitis in 1911.

Cancer.—The deaths from cancer in 1911 numbered 486, as against 474 in 1910, and 461 in 1909.

Cholera Infantum.—There were 474 deaths from cholera infantum in 1911, as against 811 in 1910. The proportion to whole number or deaths was 5.48 per cent.; in 1910 the proportion to whole number of deaths was 8.72 per cent.

Consumption.—There were 951 deaths from tuberculous diseases in 1911. These include 802 from pulmonary tuberculosis, 17 from general tuberculosis, 34 from abdominal tuberculosis, 77 from tuberculous meningitis, and 21 from tuberculosis of other organs.

Diphtheria.—This disease had a mortality of 138 in 1911, which number was 12 more than in 1910; 124 of these deaths were in Providence county, 56 being in Providence city. The percentage to the whole number of deaths was 1.60.

Fever, Typhoid.—There were 51 deaths from typhoid fever in 1911, as against 75 in 1910, and 67 in 1909. Typhoid fever as a disease and a cause of death, has gradually lessened in both respects during the last twenty-five years. This is especially evident when five-year periods are considered, and the decrease is especially noticeable in the case of Providence county cities and towns, including the city of Providence.

Heart, Diseases of.—The deaths from diseases of the heart in 1911 numbered 911, as against 914 in 1910. Diseases of this organ have been gradually increasing in the last forty-five years.

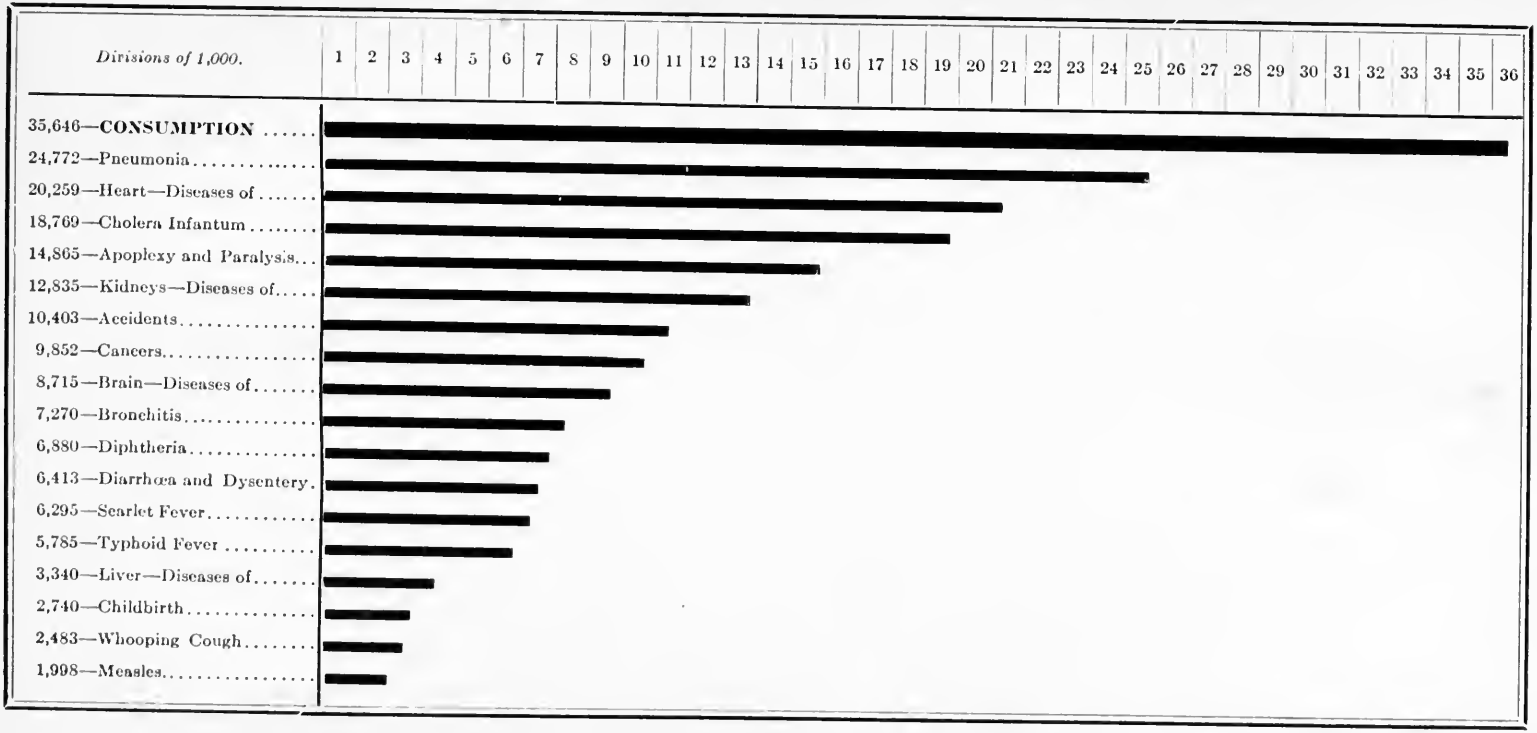
Influenza.—The number of deaths reported from this disease in 1911 was 39, a decrease of 21 from the number in 1910. The largest number of deaths from this cause was in 1892, when 366 deaths were recorded.

Kidneys, Disease of.—The number of deaths from diseases of the kidneys in 1911 was 691, which was larger by 25 than that of 1910 (666). Kidney disease has been gradually assuming large importance as a cause of death during the last forty-five years. The ratio of mortality for the five years, 1906-1910, was more than eight times as large as the ratio of the years 1866-1870.

Pneumonia.—The number of deaths caused by pneumonia in 1911 was 868, which was 225 less than in 1910.

Scarlet Fever.—There were 56 deaths recorded in 1911 from scarlet fever. This was 34 more than the number in 1910. Scarlet fever, however, has largely decreased in epidemic prevalence and proportion of mortality during the last ten years, as compared with previous periods of ten years each.

Diagram exhibiting the comparative mortality by absolute number of deaths from eighteen principal causes of death in Rhode Island for forty-six years, 1866–1911.



Meteorological Observations for the Whole State for 1912.

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of the wind.
BLOCK ISLAND.																
January	25.2	—6.2	53	9	0	13	38	3.29	—0.57	1.04	6.5	14	8	8	15	W.
February	27.9	—3.3	53	21	2	10	25	2.47	—1.82	1.45	1.6	7	12	7	10	W.
March	34.8	—1.1	55	15	15	3	20	7.65	+3.28	3.03	22	14	13	5	13	N. W.
April	43.8	0	60	16	29	4	16	3.85	+0.23	1.04	0	17	7	8	15	S. W.
May	53.2	+0.3	68	25	40	1	18	4.43	+0.68	1.13	0	12	8	8	15	S. W.
June	62.1	+0.5	78	29	47	14	19	0.21	—2.66	0.08	0	5	9	17	4	S. W.
July	68.7	+0.6	82	9	55	1	16	7.17	+3.86	3.17	0	9	11	8	12	S. W.
August	67.0	—1.7	81	15	51	31	16	3.18	—0.30	0.90	0	8	11	12	8	S. W.
September	63.0	—1.1	77	6	43	30	17	1.80	—1.20	0.62	.....	9	11	2	17	S. W.
October	57.4	+2.1	71	5	42	16	16	1.14	—2.97	0.76	0	5	14	4	13	N. W.
November	47.4	+2.1	64	7	30	29	18	3.18	—0.70	1.58	0.8	6	13	4	13	S. W.
December	41.0	+4.4	57	2	18	9	23	5.66	+1.84	1.54	5.5	7	10	8	13	S. W.
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Meteorological Observations for the Whole State for 1912.—Continued.

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT)							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of the wind.
BRISTOL.§																
January	22.4	—6.6	48	19	—6	13	30	4.28	—0.13	1.35	15.0	13	13	8	10	N. W.
February	26.9	—2.8	51	+22	0	+10	24	2.94	—1.00	1.33	0.8	6	17	8	4	N. W.
March	34.6	—0.7	55	28	11	6	24	8.04	+3.61	3.00	8.5	15	18	4	9	S. W.
April	45.4	+0.3	60	+15	27	4	21	3.98	+0.69	0.91	T.	16	10a	9a	10a	N. W.
May	55.4	—0.2	69	+18	36	1	20	3.67	+0.15	1.52	0	12	12	6	13	S.
June	64.4	—0.4	84	29	46	+8	23	0.43	—1.97	0.20	0	5	24	4	2	S. W.
July	69.4	—0.4	85	+9	53	25	23	2.02	—1.11	1.18	0	6	18	9	4	S. W.
August	67.4	—1.9	81	16	48	31	21	3.04	—0.64	1.14	0	6	19	8	4	S. W.
September	62.1	—1.6	78	8	41	30	19	2.88	—1.37	1.34	.....	9	12	14	4	S. W.
October	56.2	+3.9	72	10	36	29	22	1.81	—2.35	1.45	0	7	23	4	4	N. W.
November	45.9	+2.1	65	12	25	29	22	3.79	—0.18	1.50	2.0	6	18	7	5	W.
December	38.5	+4.9	58	6	17	9	27	6.14	+3.83	1.48	10.0	7	16	10	5	S. W.
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Meteorological Observations for the Whole State for 1912.—Continued.

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of the wind.
KINGSTOWN.§																
January	19.2	—8.5	50	+9	—9	13	38	4.29	—0.18	1.65	18.5	10	9	14	8	W.
February	23.9	—4.0	55	25	—10	11	28	3.78	—1.52	2.00	2.0	6	17	10	2	W.
March	32.6	—1.7	60	28	5	3	26	9.59	+4.08	3.53	9.0	13	13	7	11	W.
April	43.8	—1.0	73	16	21	4	31	4.61	+0.38	1.00	0	12	7	12	11	W.
May	54.8	—0.2	79	21	33	1	36	4.89	+0.32	1.75	0	11	12	7	12	S. W.
June	63.4	—1.1	88	29	36	10	37	0.80	—1.83	0.60	0	4	17	10	3	S. W.
July	68.6	—0.6	92	9	45	1	33	2.93	—0.83	1.40	0	7	15	8	8	S. W.
August	65.2	—3.4	87	15	40	31	27	4.62	+0.52	1.70	0	7	16	10	5	S. W.
September	60.7	—1.7	83	11	33	30	26	2.87	—0.99	1.05	.....	8	9	15	6	E.
October	53.6	+2.8	78	+7	25	16	34	2.13	—3.38	1.85	0	4	18	8	5	W.
November	41.5	+0.4	72	12	13	29	31	4.50	—0.58	2.05	2.0	7	16	5	9	W.
December	34.8	+3.1	60	6	11	9	29	6.87	+3.14	1.59	12.0	7	13	0	8	W.
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Meteorological Observations for the Whole State for 1912.—Continued.

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted.)	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of the wind.
NARRAGANSETT PIER.																
January	22.1	—6.8	51	9	—6	14	38	3.66	—1.35	1.11	1p	14	17	10	4	W.
February	25.8	—3.2	53	25	—5	11	27	3.12	—1.45	1.61	2.0	7	21	5	3	W.
March	31.2	—2.0	57	20	9	3	22	8.86	+4.28	3.58	6.0	15	20	1	10	N. W.
April	44.1	—0.6	67	16	24	4	24	5.09	+1.56	1.06	0	19	12	7	11	S. W.
May	54.2	—0.8	75	25	32	1	24	3.73	—0.52	1.08	0	13	9	8	14	S. E.
June	62.8	—1.6	89	29	41	14	32	0.92	—1.39	0.63	0	4	14	12	4	S. W.
July	68.5	—1.4	90	9	48	2	25	3.60	+0.28	2.32	0	10	16	7	8	S. W.
August	66.1	—2.8	83	15	41	28	28	3.39	+0.66	1.05	0	6	9	16	6	S. W.
September	61.6	—1.1	83	8	37	30	25	3.11	—0.15	1.35	.....	11	12	10	8	S. W.
October	55.0	+2.8	76	5	28	16	30	1.62	—2.92	0.77	0	0	18	5	8	S. W.
November	44.2	+1.1	63	+6	19	29	29	4.18	—0.18	1.33	3.00	9	19	0	11	W.
December	37.8	+4.3	58	+2	14	9	30	6.84	+3.32	1.51	.....	8	19	2	10	S. W.
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Meteorological Observations for the Whole State for 1912.—Continued.

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of the wind.
PROVIDENCE.																
January	20.7	—0.65	53	19	—6	†13	39	4.09	+0.27	0.74	.....	13	9	12	10	N. W.
February	26.4	—2.6	54	†22	—5	11	28	2.65	—0.79	0.98	.....	6	15	10	4	N. W.
March	34.4	—1.3	60	15	9	6	31	6.36	+2.28	1.45	.....	15	14	7	10	N. W.
April	46.4	—0.2	76	†6	24	4	35	3.61	+0.06	0.94	.....	17	5	3	12	.....
May	57.5	—1.0	81	24	36	1	29	3.99	+0.48	1.07	0	15	8	13	10	S. E.
June	66.2	—1.7	89	29	43	8	30	0.63	—2.40	0.27	0	5	13	15	2	N. W.
July	72.2	—1.2	96	9	51	1	27	1.76	—1.60	0.81	0	7	16	12	3	S.
August	67.8	—3.2	87	†12	46	31	23	2.90	—1.13	1.01	0	7	7	20	4	N. W.
September	62.6	—0.6	88	11	37	30	29	1.87	—1.32	0.99	.....	12	8	12	10	N. W.
October	55.6	+3.4	81	7	33	16	35	2.37	—1.49	2.05	0	6	18	6	7	N. W.
November	44.0	+3.6	69	12	22	29	30	2.81	—1.29	0.93	0	8	12	7	11	N. W.
December	37.4	+5.8	68	6	14	9	30	5.61	+2.20	1.12	.....	8	12	9	10	S. W.
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Meteorological Observations for the Whole State for 1912.—Concluded.

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted.)	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of the wind.
AVERAGES, ETC., FOR 1912.																
Block Island	49.3	.....	82	.....	0	.....	38	44.03	.....	3.17	16.6	115	127	91	118	S. W.
§Bristol	19.0	.....	85	.....	6	.....	30	42.32	.....	3.00	36.3	108	200	91	74	S. W.
§Kingston	46.8	.....	92	.....	—10	.....	38	51.88	.....	3.53	43.5	96	162	116	88	S. W.
Narragansett Pier	48.0	.....	90	.....	—6	.....	38	48.12	.....	3.58	.....	123	186	83	97	S. W.
Providence	49.3	.....	96	.....	—6	.....	39	38.65	.....	2.05	42.2	119	137	136	93	N. W.

All records are used in determining state (or district) means, but the mean departure from normal temperature and precipitation are based only on records from stations that have ten or more years of observation.

Letter of alphabet following month indicates the number of days for which no record was kept.

§Thermometers not supplied by Weather Bureau. †On other dates also. T indicates Trace.

TUBERCULOSIS.

The study of the prevention of tuberculosis has been continued along the same lines as in previous years. There has been an extension of the work in broader fields through the several agencies which have coöperated with the Board and individually taken up the subject.

REPORTS OF CASES OF TUBERCULOSIS.

The law which went into effect July 1, 1909, requiring that all cases of tuberculosis should be reported to the secretary of the State Board of Health, as was anticipated, did not receive a complete response from physicians to the requirements of the law. The same conditions prevailed in New York City which first made this requirement, as was the case in other cities and states. A report of only a proportion of the cases was procurable at the beginning of the operation of the law.

The reason for this failure is due partly to the probability that those from whom the reports are required do not realize that the law insists that they report at the time they discover the case, and partly to the procrastination, especially when the physician has not made up his mind to a positive diagnosis in incipient cases.

The inability to find among his papers the customary forms upon which to report the case causes delay to the extent of final forgetfulness; the cases change their physicians and the second assumes that the first has reported the case, while the first assumes that the second, who succeeds him, will do likewise, and neither makes the report. It may be that there has been quite a lapse of time between the attention of the first and second physician during which the disease has advanced materially and the second physician assumes that of course there could have been no doubt as to the diagnosis by the first physician.

He may have sent in a specimen of sputum for examination to the State Health Laboratory and receives the report of the positive presence of tubercle bacilli. He then assumes that he has reported the case. This is not correct as he has not given the necessary data required in studying out the relation of the case to associated conditions. So the patient goes from one physician to another, or failing to seek a second physician, the person dies and a new physician is called at the last moment. He signs the death return, giving as a cause "pulmonary tuberculosis." This is often the first knowledge of the existence of the case in the State. He also assumes that the case must have been reported by some other physician.

In order to secure results and to induce "the habit" of prompt report of cases and to secure correct information concerning those cases which have died without reports, a system of inquiry has been established.

An examination of the monthly and yearly copies of returns of deaths received from the several town clerks and city registrars is made and every death from tuberculosis of which there is no previous record before death is noted.

A letter is at once sent to the physician signing the death return, asking that he complete the records by a report of the conditions of the case. In most cases this report is promptly made, but many postpone the labor until it is necessary to send a second and sometimes a third "follow-up" letter.

During the first six months in which the law went into effect, July 1 to Dec. 31, 1909, only 25% of the cases were reported before death.

During the year 1910 a great improvement was shown as the result of constantly reminding the physicians of the provisions of the law and by requests to assist in making the records complete. As a result reports of cases were received as follows:

Year.	No. of deaths.	Previously reported.	Per cent. not reported.	Total cases recorded.
1909 (6 mo.)	416	614	25%	821
1910	982	1,092	29%	1,552
1911	951	1,015	16%	1,341
1912	806	987	20%	1,242

(Duplication of cases is avoided by cross records.)

It is often asked how many cases are existent in the State at any one time. This is a difficult question to answer. There may have been a thousand cases reported, but many of these have died during the year.

The report of the Commission on Hospitals for Advanced Cases of Tuberculosis, made to the General Assembly at its January Session, 1911, stated that it had received reports of 1,467 cases of tuberculosis existing in the State. Of the 823 physicians registered as practicing in the State to whom inquiries were sent for a report by the Commission, 664 replied. 400 reported no cases and 264 had cases to report.

Upon these reports the Commission estimated that the minimum number of active cases of tuberculosis in Rhode Island at that time was 2,509.

Statisticians vary in their estimates as to existing cases, some considering that there are as high as ten cases existing in some stage of the disease for every death occurring; others more conservative assume the arbitrary figures of two cases remaining for each death.

According to this report 293 patients were discharged from the Sanatorium during the year 1911, and the total number of patients treated during the year was 432. Of the cases discharged 26 were apparently cured; in 87 disease was apparently arrested; 90 were improved and 85 were unimproved, including 4 deaths.

RECORDS OF DEATHS FROM TUBERCULOSIS.

In the table which follows it will be noted that there are other forms of tuberculosis than the common tuberculosis of the lungs (pulmonary tuberculosis, called "consumption.")

Next to the pulmonary form the laryngeal form is the most communicable. These two forms are sometimes designated as "open tuberculosis," inasmuch as the secretions may be dislodged from the degenerating tissues and brought to the open air, and are disseminated

in such a manner that they may reproduce the disease in others. Other forms of tuberculosis occur, such as a bone tuberculosis, tuberculosis of the abdominal organs or of the brain, or a general disseminating infection of the whole system. Deaths occur from all of these forms of the disease.

The following table gives the number of cases of deaths from lung tuberculosis and also of all other forms of the disease, as recorded by this department for twenty-two years:

Year.	Pulmonary Tuberculosis.	Other Tuberculosis.	All forms of Tuberculosis.
1890	852	130	982
1891	740	151	891
1892	759	156	915
1893	722	146	868
1894	705	154	859
1895	799	137	936
1896	846	143	989
1897	777	152	929
1898	765	140	905
1899	823	168	991
1900	850	165	1,015
1901	844	150	994
1902	791	147	938
1903	840	188	1,028
1904	793	188	981
1905	836	195	1,031
1906	797	201	998
1907	804	208	1,012
1908	854	196	1,050
1909	781	166	947
1910	831	151	982
1911	790	161	951
Total	17,599	3,593	21,192

In 1912 there were recorded 806 deaths from all forms of tuberculosis.

SUPPRESSION OF TUBERCULOSIS.

For the suppression and control of the one disease which has a greater mortality than any other and which is in a measure preventable, many means are being utilized to this end. Education of the people in the cause and prevention of the disease as well as systematized care of those suffering from it are the two practical means for exerting a deterring influence on the continuance of tuberculosis.

The work of the Board is restricted to the study of the prevalence of the disease, education through lectures, exhibits and literature. The work of direct control and treatment of the cases is carried on by the State Sanatorium, the Annex or Branch of St. Joseph's Hospital at Hillsgrove, the tuberculosis wards of the Providence contagious hospital, and material aid and assistance of a practical nature is supplied by the Rhode Island Anti-Tuberculosis Association. The local leagues and societies organized under the stimulus of the State Association in different cities, towns and group of towns, are active in education, prevention and cure, through utilization of the corps of district nurses, the most practical and important line of work in this connection. Through this agency the patients receive repeated advice and encouragement. The physician is unable to do little except make infrequent visits and give advice which is seldom heeded. The constant reiteration of the district nurse on her daily rounds produces habits in the patient of care of self and others.

During the year there have been organized three new associations which have whole or in part campaigned against tuberculosis. It is fortunate that these societies are formed for this essential work since the state and municipal authorities take little heed of the home conditions.

It does not seem to be understood that the suppression of this communicable disease is a duty for protection and economy; it is assumed to be a philanthropy only. While this element enters into the case, yet the attention given to those unfortunates is not a simple question of helping those in need, but it is a factor in the health and

longevity of the people and the execution of the work properly belongs to municipal and state health departments.

Five hundred dollars was appropriated by the Health Department for the maintenance of a day camp for tubercular patients of Pawtucket. The camp was located on property owned by the City of Pawtucket, on Smithfield avenue, near Grotto avenue.

The new tuberculosis ward at the Providence City Hospital was opened for inspection May 7, 1912. The wards each have accommodations for twenty persons. A large veranda allows the patients to be wheeled out into the open air at will. A suitably equipped laboratory is located in the basement. There is also a refectory for the out-patients and a place of refuge for those patients in stormy weather. The cots inside are arranged to give the maximum amount of comfort to the patients, and each one has a light over the bed which at night can be turned on or off by the patient. There are also private wards for the care of the more advanced cases which are required to be separated from those in the general wards.

STATE SANATORIUM.

The State Sanatorium is located at Wallum Lake in the northwestern part of the State. It is intended for the reception and care of incipient or slightly advanced cases only. Accommodation is intended for about 135. During 1912 there were 313 tuberculosis patients discharged, 21 apparently cured, 86 had the disease arrested, 120 were improved, and 86 unimproved, including 8 deaths.

Of 1,512 tuberculosis patients treated in the last seven years, 1,508, or about 99.7 per cent. have been traced; of these 549, or 36 per cent. are working full time. These figures include deaths and advanced cases.

It is estimated by the Superintendent, Dr. Harry L. Barnes, that excluding the possible recovery of one-third of the ex-patients of the institution who might have recovered without sanatorium treatment, the other two-thirds would have represented an earning

capacity of over two hundred per cent. annual dividend on the money invested in the Sanatorium.

Basing his conclusions on the study of 170 cases, Dr. Barnes figured that the total earnings of all the ex-patients of the Sanatorium during 1911 amounted to over $266,000, a sum estimated to be about three times the sum expended for the maintenance of the institution, including four per cent. for depreciation.

In treatment, tuberculin has been used with results about equal as with ordinary sanatorium treatment. Tuberculin is now being utilized in extra-pulmonary lesions and fifteen patients have been treated with artificial Pneumo-thorax, work and exercise limited to the extent of the individual's ability and a card record of such work being kept by a doorkeeper.

A study of the incidence of pneumonia following open air living shows no increase or diminution of that disease under these conditions.

An oculist and dentist are attached to the visiting staff of physicians.

An annual tuberculin test is made of the cows supplying the institution with milk to be assured that this important food is free from bovine tubercle bacilli; a semi-annual test is recommended on the side of safety. Oleomargarine is substituted for butter as a food to avoid existence of tubercle bacilli in fresh or unsalted butter.

The cost of maintenance per capita has been $9.61 per week, the rate in Maryland (the lowest) being $6.93, and Michigan (the highest), $11.69.

Garden vegetables are almost exclusively raised by the patients' labor. A piggery and a hennery also assist in reducing the cost of provisions.

The water supply is obtained from the large and undefiled Wallum Lake nearby. The sewage is treated by sprinkler and intermittent filtration through coarse stone, the effluent flowing into a nearby brook which does not serve as a drinking supply for any persons located below on the water course. The water supply and the effect

of treatment of the sewage is periodically studied by the State Board of Health, and the milk supply also receives attention.

The Hillsgrove Hospital, or annex of St. Joseph's Hospital, in Providence, receives cases in all stages, most of which, however, are far advanced. This has an accommodation for about 40 patients, and was the only institution which would receive advanced cases until the opening of the Providence City Hospital.

The State Almshouse cares for its tuberculous patients, carrying on its lists an average of over 50, while in the State Hospital for the Insane the tuberculous are separated as far as possible from the other inmates.

The Providence Anti-Tuberculosis League in 1910 established a summer preventorium at Nayatt for the reception of a limited number of persons, many of whom were debilitated children, and who were in families where the disease existed. In 1911 this work was repeated at Oakland Beach, and in August, 1912, a permanent building was erected at Hoxsie.

A study of the means for the control and suppression of tuberculosis has led those who are familiar with the conditions to believe that an effort should be made to care for the numerous chronic cases of this disease existing throughout the State, which in the advanced stages are more liable to increase the infection. This is especially true under conditions where there exists a case in a large family housed in close contact, in a tenement of small size. The Rhode Island Anti-Tuberculosis Association and those who are interested in the subject, have argued upon the General Assembly to undertake the erection of one or more hospitals for the reception of advanced cases of tuberculosis.

TUBERCULOSIS EXHIBITS.

During the year the complete exhibit of the State Board of Health was presented in two places; at the Branch Avenue School in Providence, and in the town of Bristol. The tuberculosis exhibit of the Board is compactly constructed, boxed and cased for transportation,

is quickly erected and easily dismantled, packed and ready for shipment.

The exhibit at the Branch Avenue School opened April 8th and closed April 14th. A large hall on the third floor of the building was made available for setting it up and gave ample facilities for the most advantageous display of the large exhibit, which included the dental and milk exhibits.

In one school room on the ground floor the seats were removed and replaced with settees providing a lecture room which, while not commodious, accommodated seventy-five people. In this room was placed the regular moving picture outfit of the Board and the films used to supplement the lantern slide lectures on the subject of tuberculosis.

The exhibit was presented under the joint auspices of the Providence League for the Suppression of Tuberculosis and the State Board of Health. The school building, located in Eagle Park, a populous district, the residents being largely Italians, offered a good opportunity to reach a class of people who might not be secured by attendance upon the exhibit if placed in the centre of the city.

That the effort was appreciated was shown by the large attendance each day and evening. The exhibit was open from ten o'clock in the morning until ten in the evening, except Sundays, when it was open from two o'clock until ten o'clock. It had a seven day run, during which period there was an attendance of more than 4,500 persons. In the beginning the attendance was largely made up of children of all ages, it being school vacation.

As the reports of the visits of the children were carried into the homes, however, the adults realized that it was something worthy of attention. The fear that it was intended for some purpose which might involve them in some scheme which was for their betterment, but which might require sacrifice, was displaced with the understanding that it was for the good of all.

As with all the exhibits presented by the Board the display is so arranged that there is only one entrance and that at the begining of the story. There is likewise one exit and that is located at the very end of the display so that the visitor must see the whole of the exhibit as he passes through even if it be in a hurried manner.

It is arranged in such a way that the demonstrators who conduct visitors in small groups through the exhibit are able to first show the prevalence of tuberculosis in the United States and in Rhode Island and the need of taking measures to prevent the spread of the disease. Following this are shown many of the unsanitary conditions existing where tuberculosis thrives and the provisions made for the care of consumptives in the hospitals about the State and in other states.

During the week of the exhibit lectures were given by the following persons: Rev. Antony Bove, Dr. Gardner T. Swarts, Dr. J. J. Kenney, Wallace Hatch, Dr. F. E. Burdick, Dr. William H. Buffum, Dr. William H. Peters, Dr. A. A. Fisher, Dr. J. Edmund Brown, Dr. Henry W. Burnett, Dr. A. Fella, Dr. E. S. Brackett, Miss Winifred Fitzpatrick, Dr. A. G. Fidanza, Dr. L. Maiello, Dr. Jay Perkins, Dr. Murray S. Danforth, Dr. Jacob S. Kelly, Miss Lydia G. Chace, Dr. Harry L. Barnes, Dr. Ellen A. Stone and James B. Williams.

The exhibit at Bristol opened April 27th, in Bristol Artillery Hall. In the mornings of the eight-day period during which the exhibit was open, the school children accompanied by teachers, visited the hall, and in the evening the attendance was limited to adults. The complete exhibit of the Board of Health as previously described, was set up in the hall and proved thoroughly interesting to the thousands who attended.

The lectures and moving pictures shown in connection with the exhibit were given at the Colt High School, it having been found inconvenient to have the exhibit and lectures in the same hall. There was an attendance of over 4,400 persons.

SMALLPOX.

In the fall of 1911 smallpox had gained such considerable spread in the Pawtuxet Valley before its presence was discovered after establishing a diagnosis of the first case, that over 75 cases were discovered within a few days. These were in all stages from that of the commencement of the eruption to last stages and complete recovery. Before the epidemic was checked additional cases were discovered and cared for and doubtless many mild cases were undiscovered.

At the beginning of the following year there were still 10 patients held in quarantine in the towns of Warwick and Coventry. On January 6th, the last 2 cases in Warwick were released, while one family in Coventry was still held in quarantine.

Although the epidemic appeared abated, yet it was to be expected that isolated cases would later be found. On January 20th, a new case was found in Crompton, Warwick. Another case was discovered on the Cranston side of the Pawtuxet Valley and was cared for by the health officer of that town. Still another case appeared as late as the first of May, in Coventry.

In Providence, at the close of the year 1911, there were a few cases of smallpox which could not be discharged from quarantine. On January 2nd of the new year a new case was discovered in a yard employee of the New York, New Haven and Hartford Railroad Company. The patient was one of the employees who had not been vaccinated at the time his fellow workmen were, during the outbreak in 1911.

In January many new cases were reported in various parts of the State and stimulated by this prevalence of the disease, an order was issued by the authorities at Brown University that every student must be vaccinated anew or show record of previous vaccination before he would be allowed to resume studies. According to figures submitted by the University authorities about 350 students were newly vaccinated.

In February of 1912, upon the arrival of the Fabre Line Steamship Madonna, a 16 year-old Italian girl was found suffering from a mild case of smallpox. The case being discovered on the boat it was isolated on board from other passengers and the health authorities were informed. The girl was undoubtedly infected with the disease before the boat sailed from Naples. It was reported that all passengers were vaccinated at the port from which the boat sailed. The date of infection was evidently ten to fourteen days prior to embarkation and the vaccination of the girl had no effect in preventing the disease.

The same month, February, brought to light many more cases of smallpox and six cases in one family in Warren were discovered. Several cases were also reported in Swansea, and all the houses were quarantined. Schools were closed in Barrington and in other towns in the area which was affected, for several days to prevent the spread of the disease.

March 6th brought out the discovery of another case of smallpox in Fiskeville, in an 18 year-old girl, and the day following a case was found in Central Falls.

April 17th, the first case of smallpox recorded in Pawtucket in ten years was reported to the Pawtucket Board of Health. The patient was an employee of a factory in Providence.

On May 18th, the one hundred and fifteenth case of smallpox in Coventry was discovered and reported, the patient being a man on a visit from Canada. He was treated at the Coventry detention hospital.

On February 15, 1912, a case of smallpox was discovered in Central Falls in the person of one of the sisters of the Community of Sisters who was a teacher in the St. Mathew's Parochial School in Central Falls. The patient was removed to the detention hospital at Crow Point. Another Sister of the Community acted as companion and nurse. There were 300 children in attendance in the school, of which number the patient had charge of 20. Many of the children of the school had been vaccinated the previous year

during the outbreak in the Pawtuxet Valley. A second case of smallpox was discovered on March 6th, the patient being the 18 year-old daughter of Omer Duray. The two patients who had been at the detention hospital previously were discharged March 6th.

Smallpox in Coventry and Warwick ceased on March 4th, when the last card was removed from the houses, but on the same day another new case was located in Fiskeville, the first to appear in that section of the Pawtuxet Valley.

On January 9, 1912, the Pawtucket School Committee amended its rule conforming to the State law requiring the vaccination of school children by adding to the previous rule the following:

"Teachers are authorized to accept a statement of a practicing physician that he has made repeated unsuccessful attempts to vaccinate a child and that he does not advise further attempts at the time; or a statement of a practicing physician that the physical condition of a child is such that it would be injurious to vaccinate him, in lieu of a vaccination certificate, for a period not exceeding three months from date."

Several years ago an ideal detention hospital was built by the city of Pawtucket for the purpose of isolation of contagious diseases, especially smallpox, which could not conveniently or with safety be detained in the home.

A case of smallpox was reported to the Pawtucket Health Department, April 17, 1912, in a man who worked in the city of Providence, at the Nicholson File Company, and boarded with his sister in Pawtucket.

At the time of the discovery of this case there was quarantined or isolated in the hospital, a case of leprosy. Public opinion having been so grossly misdirected in regard to the contagiousness of this disease, the health department did not even deem it expedient to place the case of smallpox under the same roof with a case of leprosy. While the presence of the two cases of different diseases were not necessarily a source of danger to each other under the present knowledge of communicable diseases, yet there appeared to be some ob-

jection to placing the smallpox case in the same building with the case of leprosy.

Leprosy is acknowledged to be only mildly contagious in a northern climate. Some maintain that it cannot be communicated at all in this climate. However, if the patient and the secretions from the nose or any ulceration which may be present are prevented from coming in contact with another person the disease cannot be spread.

Smallpox is easily communicable by secretions of the mouth and by means of the scabs or crusts which when dry, fall off from the points of eruption on the smallpox patient. In comparison with leprosy it may be considered as highly infectious. While it might seem that there would be some objections on the part of the leprosy case to receive the case of smallpox as a fellow guest at the city's detention boarding house, yet the smallpox case should have no scruples against living in a room removed from the leprosy case.

Again, the patient having leprosy, having been successfully vaccinated against smallpox, would be in no danger even if the two patients were confined in the same room.

As has been said it was deemed most expedient to allow the smallpox patient to remain at home where, if kept from the general public and the members of the family who were not as yet vaccinated, he would be as safely protected, and the public would be as well protected as if he were in the detention hospital.

RABIES.

Rabies or hydrophobia, which has appeared spasmodically and at times with considerable persistence, has continued to do so during the past year. Many wandering dogs, strangers in the vicinity in which they appear, would make a rapid pilgrimage from town to town or from a neighboring state into Rhode Island. After acting in a wild manner, biting other dogs, also other animals, hens, chickens, children and adults who came in their path, they would disappear not to be seen again, at least in this State.

Several dogs were captured and destroyed and their heads examined for the presence of Negri bodies found in animals suffering from rabies. In many cases these distinctive cells were found in the examination.

When the result of the examination was positive all persons who had been bitten by the dog were advised to submit to the Pasteur treatment for rabies. In most cases treatment was accepted and the patient did not have the disease.

The treatment was usually administered by a physician who was retained by the Health Department of the city of Providence for this purpose. This allowed the physician to receive repeated experience in the administration of a remedy which is not used with sufficient frequency to give assurance to the average practitioner that he is performing the operation properly. The material used was received from the Health Department of the city of New York, accompanied by explicit directions for its use, so that any physician or surgeon who cared to assume the responsibility of the treatment might give it.

The treatment was administered at the office of the physician, the patient receiving a hypodermic injection of the anti-rabic material and then at once returning home. Those who took it suffered no ill-effects. In one or two instances where the treatment was refused or delayed too long to be effective, the patient died of rabies.

On January 2nd, the head of a black mongrel dog, examined at Brown University at the request of Dr. Charles V. Chapin, Superintendent of Health of the city of Providence, showed a positive case of rabies. A sore on the dog's foot tended to prove that it had been recently bitten. As a result the police were requested to look out for queerly acting dogs for a week to prevent further trouble.

A bull dog owned by a Providence undertaker, early in January, severely lacerated three horses in the stable owned by the same man. The dog's head, upon examination, showed that it was a positive case of rabies, but the disease had not advanced to a stage where it could be suspected and the only intimation of it was found in the dog's queer actions; it would not have been discovered if the dog had not attacked the horses.

The Superintendent of Police of Providence issued a general order to the police to keep a sharp watch for collarless dogs, and for any other dogs which acted queerly, in the hope of preventing any spread of the disease.

Just a few days later a man and a horse were bitten by a dog believed to have had rabies, although the dog was not captured. The man's wound was cauterized.

On February 15th a boy in Pawtucket was bitten by a dog. The boy was taken ill on March 21st and died the day following with distinct symptoms of rabies. The dog was secured and tied up after he had bitten the boy. The dog officer was called and as he entered the yard where the dog was tied, the animal sprang at him and bit through his trousers, inflicting a slight scratch on the calf of his leg.

The dog officer pronounced the dog rabid and strongly advised the father of the boy who was bitten to see to it that his son was given the Pasteur treatment. He, however, delayed the treatment and the boy died from rabies.

The dog officer hearing of the death of the boy, became alarmed and remembered that he had himself been bitten by the same dog which attacked the boy. He had up to then failed to think of his own need of treatment. Suddenly after the death of the boy, the dog officer developed violent paroxyms requiring restraint by several men and the use of the straight jacket. He was treated by his attending physicians with an injection of carbolic acid, subcutaneously, using a solution of 1% strength. One-third of an ounce was injected about every hour and the convulsions of the patient lessened and he apparently recovered under the heroic treatment.

In Lakewood, in March, a watch dog which was confined in a barn on a farm was bitten by a strange dog which had wandered into the barn and then disappeared. No thought was given to the strange dog and it was not imagined that he was rabid. Some days later, however, the watch dog without showing any violent symptoms attacked a cow in the barn. As he was confined it might be assumed that he had committed the act in a fit of anger. For safety, however,

the dog was killed and an examination of the head showed the presence of the Negri bodies of rabies. The cow was killed and sold to a rendering establishment. No person was known to have been bitten by either the strange dog or the watch dog.

A stray dog ran wild through the streets of Riverside on April 9th, and before it disappeared from that section had bitten one boy and two other dogs. On April 23d, another dog, or perhaps the same one, duplicated the wild running performance, biting a six-year-old boy and several animals. The dog was finally shot and an examination showed rabies.

Owners of dogs in that section were notified by the police to restrain them, or if they had been recently bitten, advised that they be killed.

Early in April a stray dog visited various parts of the Blackstone Valley, making an appearance in Central Falls, Marieville in North Providence and other towns and villages. Several dogs were bitten by the stranger.

On April 29th, a dog owned by a resident of Central Falls, a dog which was bitten by a stray dog three weeks previously, but which up to that time had not shown symptoms, developed what appeared to be a case of rabies and upon order of the health officer was killed. Its head, examined at Brown University, disclosed a positive case of rabies.

On May 3d, a stray dog attacked a pig in Riverside, chewed off one ear and otherwise mutilated the pig. The dog was shot, but the head was not examined for rabies.

A seven-year old Central Falls girl died of rabies on May 11th, as the result of being bitten by a dog on April 12th. On that date, with other children, the little girl was playing about the street. A rabid dog came along and bit the girl on the lip, a slight cut, and bit another dog. The stray dog then disappeared.

On May 1st, the dog which the stray dog had bitten, having in the meantime been confined, commenced to show signs of queer actions. The dog was shot and an examination of the brain indicated a genuine

case of rabies. The parents of the little girl whom the stray dog also bit then became frightened and applied for application of the Pasteur treatment. This was at once given. The delay apparently had been too great, however, for the child developed distinct signs of hydrophobia and later died, a period of twenty-one days having elapsed between the date of the biting and that of the commencement of treatment.

Early in May a stray dog attacked a little girl who was offering it a sandwich, thinking it hungry. The dog severely tore the child's hand and tore the dress of a woman standing nearby before making away. This occured in Greenville.

A big black mongrel wandering through the centre of Providence, May 15th, bit a fox terrier and a stray cat before it was shot by the dog officer. The week before this occurrence several reports had been made to the police of pet dogs being bitten, and it is believed that many of the reports were due to the actions of the animal finally shot.

An eight-year old Providence boy was bitten by a dog May 15th. The animal leaped over a fence into the yard and injured the boy's back.

A dog, afterward killed, examined and found to have rabies, bit three persons in Woonsocket about May 26th. The dog first wounded the son of the owner. A lieutenant of a fire company offered to help tie the dog up and was himself bitten on the hand, then the dog broke the rope, escaped, and bit a visitor in the city, in the shopping district, after knocking him into the gutter. The dog bit several other cats and dogs. He was finally killed and the three persons bitten were given the Pasteur treatment at the expense of the city of Woonsocket.

On May 26th and 27th, reports of children in Providence having been bitten by dogs were made to the police. In Cranston and Johnston the dog officers inaugurated a joint campaign to get rid of stray dogs because of the many reports of damage done by them.

The many reports of rabid dogs brought to the attention of the State Board of Health were tabulated by the Secretary and efforts

were made to secure information connected with each case. One of the special objects of the work was to keep track of the rabid dogs running at large and attempt to have them destroyed. The Secretary asked all health and dog officers throughout the State to communicate to him every case of rabies in dogs, or persons bitten by dogs, no matter how insignificant the case appeared at the time.

On May 28th the Woonsocket City Council passed in concurrence an ordinance requiring that all dogs be restrained and that any dogs found running at large should be killed.

A dog, frothing at the mouth, was shot and killed at the corner of McNeal Lane and Westminster Street, Providence, on June 6th. It is not known whether or not the dog had bitten anyone.

A five-year old Pawtucket child was attacked and bitten by a dog, June 28th. The dog was acting suspiciously and was later killed, but the brain was not examined.

A dog owned by George A. Lenk of Thornton, was shot June 28th. This dog was one of several bitten by a stray dog a few weeks before. The Lenk dog developed a positive case of rabies.

EXTRACT FROM THE REPORT OF THE SUPERINTENDENT OF HEALTH OF THE CITY OF PROVIDENCE.

This disease appeared in Providence, in July, 1906, for the first time in many years, and cases have been occurring at intervals ever since. The disease reached its maximum in November, 1906, when 14 persons were bitten by rabid animals. A three months' muzzling law went into effect January 1, 1907, and since that time rabies has not been epidemic in the city. Occasionally rabid animals are found, but they are mostly vagrants which stray in from adjoining towns.

In 1910, 5 rabid animals came to the notice of this department, and in 1912 there were 25. Of these 24 were examined at Brown University Laboratory as follows: January 2, February 1, March 5, April 1, June 2, July 1, August 3, October 5 and November 4. Besides 16 were reported as having rabies, 6 others were reported as negative, 1 doubtful and 1 was so decayed and 1 so mutilated that no examination could be made.

Twenty-one persons bitten by rabid animals received the Pasteur treatment from Dr. A. A. Barrows. The cost to the city for this treatment was $945.00.

Since 1906, 118 persons have been bitten by rabid animals in Providence. Of these, 114 have had the Pasteur treatment, and one of them, treated at the Institute in New York (see Report 1906), later developed rabies and died.

In 1912 there were 45 other dogs which had bitten persons, reported at this office. The sanitary inspector, Mr. George L. Butts, who has had much experience with rabid animals kept these under observation until satisfied that rabies was not developing.

LEPROSY.

Leprosy is a disease which when discovered produces more alarm than the announcements of the discovery of a number of cases of smallpox, the name having been passed down in biblical history as being a loathsome, highly contagious and pestilential disease.

At present there is known to the authorities only one case of leprosy in the State. This one case was discovered by accident in May, 1911, in the Massachusetts General Hospital in Boston, where he had been taken by his parents for treatment. The case was a boy 15 years of age, a resident of Pawtucket, and an attendant at the public schools. It was assumed that the disease had been contracted in New Orleans where the parents were resident for a period while the boy was quite young. Facial enlargement was noticed five years before the actual diagnosis, when the disease was fully developed and the diagnosis confirmed by the presence of bacilli of leprosy in the secretions of the nose.

The health authorities, under the hysterical demand of the laity, isolated the lad in the city contagious disease hospital of Pawtucket, where he has been confined with an attendant ever since.

It seems unfortunate that the public will insist upon isolation of a young lad who has many years of desolation before him, within a

compound without any freedom to see beyond a restricted, uninteresting area. Efforts were made to secure an isolated farm of small acres, where he might have a certain amount of freedom and employ his time with gardening or some actual occupation.

From the judgment of those who have knowledge of this subject, the possibility of extension of the disease from a given case is practically nil in the northern climate, with the opportunity of securing sanitary and healthy food and precautions which can be observed by an intelligent person. When we reflect upon the fact that tuberculosis is a distinctly communicable disease and that there are upwards of 3,000 cases in the State, with an average of 900 deaths a year, and also when we are aware that many precautions against the spread of tuberculosis are ignored, it seems unexplainable that one case of leprosy should receive strict attention. It is claimed by those who are competent to state that a careful consumptive need not be a source of danger to his family or others. Would not this statement be true in a case of leprosy in a family of intelligent people and with an intelligent patient?

Cases of leprosy are appearing from time to time in the different parts of the United States. If they are found in Massachusetts they are removed to the leper colony at Penikese Island. If found in Minnesota or in the city of New York the authorities have no anxiety in regard to the cases unless they be indigent and unable to care for themselves; they are then placed in a colony set apart for the purpose.

One case of leprosy was located in the city of Providence, a waiter in a Chinese restaurant, a Chinaman. He went to Boston about June 1, 1912, for treatment and was found by the authorities of that city to be a sufferer from leprosy, and was sent to the leper colony at Penikese Island. The victim had worked in the Olneyville section of Providence for about a year. A sore developed on his arm and local physicians who were called disagreed as to the diagnosis and the victim decided to go to Boston to consult specialists. He visited a compatriot doctor and was escorted to a surgeon. The matter was communicated to the Boston Health Board and he was sent to the so-called leper colony.

TYPHOID VACCINE IMMUNIZATION.

The experience of the U. S. Army Medical Service, confirmed by the experience of others, has shown distinct evidence of the possibility of immunization against typhoid fever by use of anti-typhoid vaccine.

The Board secured a supply of the anti-typhoid vaccine and placed the packets containing it at the several stations where anti-diphtheritic serum was supplied free to those unable to pay for the same.

Early in January a circular was sent to every physician practicing in the State, that they might be acquainted with this new effort of the Board in the way of prophylaxis and control of a communicable disease.

FREE TYPHOID IMMUNIZING SERUM.

The State Board of Health has now placed at the disposal of physicians typhoid bacterin (typhoid vaccine) for use in cases where the attendants or those associated with an existing case of typhoid fever are in sufficiently close contact with the case to make it possible for someone to become infected. The serum is to be dispensed in the same way as the diphtheria antitoxin, for use in families where they are unable to pay for it. The dispensing stations will be the same.

This action is taken as a means of preventing the many otherwise unavoidable occurrences of secondary cases in the same family. Given a case of typhoid fever in a tenement of the average capacity, with several in the family, the woman of the house necessarily acting as nurse, cook and server of meals, all at the same time, there is offered every opportunity for this person to contract the disease or to infect other members of the family.

The bacteria, which are the causative agent in producing typhoid fever, develop in the intestine and are to be found in the fæces and urine of typhoid fever cases, during the disease and sometimes for a long time afterwards.

It has been suggested that the attendants can be warned and required to observe strict cleanliness of the hands, and to wash them every time they may be soiled by waiting on the patient. This warning is given by both the physician in attendance and by the health officer, who is expected to visit every case of typhoid fever to ascertain the sanitary surroundings and to give a circular of advice to the family. But this precaution is of little value. It is useless to expect a woman who is obliged to arise at five or six in the morning, cook the morning meal, wash and nurse the baby, prepare two or more children for school, secure the food for the day and see that it is cooked at noon and that the dishes and utensils are washed

and put somewhere, and at the same time attend to all the wants of the patient, her own physical demands of nature, and then be up all night with the patient perhaps, and with one small sink, with a limited supply of hot water, to remember to wash her hands every time she waits upon the patient.

With the toilet closet in a back entry or a vault outside the house it is with difficulty that the attendant upon the patient can avoid soiling hands, food and eating utensils with the excreta coming from the patient.

It would be assumed that nurses being trained in our general hospitals might understand these requirements; plenty of running water, soap, convenient toilets to receive the dejecta from the patients, yet in one of our model hospitals in New England, not only nurses, but the interne or resident physicians have been infected to a considerable number while resident in the hospital. If accidents can happen under these favorable conditions, what are the possibilities in a four-room tenement occupied by more than four persons? The serum is for the purpose of placing in the hands of physicians and these unfortunate families a means of preventing a spread of the disease among them and lessen the possibilities of their carrying the disease to others outside of their homes.

The value of the immunity given by the use of this prophylactic serum has been thoroughly tried for a long period. At the present time the attendants of the Massachusetts General Hospital, Presbyterian Hospital in New York, and the Rhode Island Hospital, volunteer to acquire this immunity for their own safety when appointed for duty. It has been tested by the German, English and United States armies during different campaigns, and upon the enlisted soldiers of the United States. Every soldier in the U. S. Army at the present time, under the age of forty years, is required to receive this protective.

The Board feels that as with the anti-diphtheritic serum when it was offered to physicians for free public use, that the value and the safety of the use of the material has been established for a sufficient length of time to warrant the Board in taking the responsibility of recommending it to the profession. The strength and purity of the production is assured by the system of inspection and control maintained by the United States Public Health and Marine Hospital Service through its biological laboratory at Washington, and is issued only on a license to the firms producing it.

The enclosed circular of data issued by one of the producing biological pharmacists gives certain data of interest.

Yours truly,

GARDNER T. SWARTS.
Secretary.

A few physicians finding cases in families where there was every opportunity for the spread of the disease from the patient, availed themselves of the prophylactic, but its use has not been as common as might be anticipated. The physician having taken chances many times before and realizing the necessity of making three consecutive injections into several members of the family, postpones using the

vaccine until their fears are allayed. Like any new remedy, and as with the use of anti-diphtheritic serum, the profession is slow to adopt innovations. If the vaccine was for use in treatment, as well as prophylaxis, no doubt much of the vaccine would be used.

The Major of the Medical Department of the Rhode Island National Guards, being desirous of immunizing the State Militia that they might be immune in case of a call to service, as well as affording the members individual protection during their civil occupations, made requisitions upon the supply of typhoid vaccine which the Board had on hand, and the request was granted.

Between 200 and 250 of the men received the injections. No inconvenience from its use was experienced except in one or two instances when a slight fever was produced, lasting for a day.

The efficiency of the vaccine in prevention of typhoid fever among a large aggregation of persons is shown in the comparison of the number of cases and deaths occurring during the several wars. During the Civil War, which lasted four years, there were 80,000 cases of typhoid fever reported; probably many other cases occurred which were diagnosed as malaria. During the Franco-Prussian War, which lasted but six months, there were 73,000 cases, and 31,000 cases with 6,000 deaths during the Boer War.

Of 120,000 United States troops serving in the Spanish-American War, only a few of whom came within the sound of the firing line, there occured 20,000 cases of typhoid fever, a preventable disease, with 1,500 deaths. Of all the mortality during this war, typhoid fever was accountable for 84%.

At the present time the U. S. Army regulations require that all soldiers under the age of 40 shall receive this immunization.

The policy or effectiveness of this was shown in the summer of 1911 when there were 20,000 men mobilized along the boarder of Texas. They remained in camp and on the march for a period of over four months. All of the men under 45 years of age were inoculated with typhoid bacterin. Only two cases of typhoid fever appeared among these men. One occurred in a soldier before he had received

the third dose of bacterin and the other, a teamster, who refused to receive the prophylactic.

The water supply in both instances was from an artesian well of determined purity. Although a higher degree of sanitation was maintained in the second mobilization, especially as regards the presence of flies, yet the men were not confined in camp, but visited the neighboring cities of San Antonio and Galveston, where they dined, lunched, drank and slept. In these two towns during the two months of occupation, 241 cases of typhoid fever with 19 deaths were reported among the residents.

"The 11th U. S. Cavalry participated in a military tournament in Nashville, Tennessee, lasting ten days and on the return to Fort Oglethorpe, Ga., typhoid fever appeared and spread until 10 cases had occurred. Only 165 of the 11th had been immunized. The remaining 736 persons in the regiment were then inoculated and no more typhoid appeared, although later the larger part of the regiment took a march of 300 miles, drinking any and all water which they found on the way, without preliminary boiling."

All British soldiers sent to the Indian service are immunized. Of 10,000 men who were thus treated only 36 cases of typhoid fever occurred, while of 8,932 soldiers not treated, 272 cases occurred.

INSPECTION OF PUBLIC SCHOOLS.

Provision is made under Chapter 725 of the Public Laws of Rhode Island for the inspection of public school children to determine if any disease or abnormality of eyesight or of hearing is present in the children examined. Any town or city providing medical inspection, approved by the State Board of Education, shall be entitled to receive annually from the State appropriation an amount equal to one-half its annual expenditure for such purpose, said amount not to exceed two hundred and fifty dollars. One or more school physicians may be employed by a school committee and examinations shall be made at least once during the school year.

In addition to this inspection a more thorough examination is made of the children in attendance to determine if they possess any physical defect or have any disease which may be communicable. This includes examination of eyes, ears, nose and throat, deformities which may be corrected, the condition of the teeth and affections of a nervous character.

Inspections for this purpose have been established in eleven cities and towns. The city of Providence has a staff of four school nurses, three medical, two oculists, one dentist and one neurologist.

In the city of Providence there were 5,268 pupils examined who showed the presence of disease as follows:–

Specific infectious diseases	154
Oral and respiratory diseases	1,142
Diseases of the ear	269
Diseases of the eye	1,928
Diseases of the skin	977
Miscellaneous diseases	798
	5,268

Dental inspection showed that of 4,766 pupils who were examined, 3,795, or 79.6 per cent. had diseased teeth. Of those examined 1,005 had aching teeth which had received no attention. As a result of these examinations, 964 pupils secured dental treatment.

The dental inspector in connection with his work reported that he had found a number of the pupils who were addicted to the use of cocaine which they had used for the easement of aching teeth. Mr. Randall Condon, Superintendent of Schools, reported this condition of affairs to the School Committee.

The neurologist examined 136 children, of whom 16 were recommended for regular classes, and 13 for the ungraded class; 25 having reached their level were recommended to be placed in an institution for feeble-minded or to be taken care of at home. 80 children were recommended for individual instruction in the schools for backward children. One child was sent to the Sockanosset School at Howard, and one child was sent to the kindergarten."

Children who require treatment carry a note to their parents who are requested to see that the child receives medical attention either from the family physician, or if they are not in a position to pay for a physician to take the child to one of the several medical dispensaries for treatment. 1,255 of those examined reported that they had followed advice. In addition to this 2,112 children were examined and treated by the city physician at the Health Department.

The effect of these examinations is a prevention of the spread of many contagious diseases and the avoidance of continuance of pupils in attendance who are a hindrance to the progress of all the other pupils.

A free dental clinic which had been maintained at Memorial Hospital in Pawtucket for several months was discontinued the week ending May 18th. This clinic was established following a gift to the hospital of a complete laboratory and surgical equipment. The reason given for its discontinuance was because of lack of sufficient funds to meet the needs of the clinic.

Medical inspection in the public schools in the town of Warwick as adopted late in 1911 by the School Board, went into effect April 22, 1912. It was announced at the outset that the most important tests which the school children would be put through were in relation to vision and hearing, it being contended that many failures among the lower classes were due to defects of hearing or sight which, unless corrected become so acute as to materially retard the progress of the child in school work. Examinations were to be made for adenoids and the throats of the children were also to be examined. In connection with this work a dental inspection was provided.

INSPECTION OF SUMMER CAMPS.

The services of Dr. Richard H. Miller were secured as inspector, and all of the summer camps which could be located by him were given a thorough sanitary inspection as a result of which he submitted the following report:

"During the summer of 1912 complaints were received from campers and from residents located near certain summer camps, that conditions existed which were unsanitary. As was to be expected where there was no community of interest under some individual control or regulation, sanitary conditions will resolve themselves into a state of everyone for himself and let your neighbor take his chances. If in a camp there are a large number of occupants there must naturally be a few who are shiftless. The careless deposit of garbage or swill anywhere most convenient leads those who are tidy to become careless, believing that it is useless to try and keep their surroundings cleanly when their neighbors take no care.

"With an outbreak of typhoid fever in a summer camp the previous year, it was deemed desirable to ascertain the actual conditions existing in the various camps throughout the State, especially on the shores of Narragansett Bay, where most of them were located. An inspector was detailed by the Board to make a sanitary survey of these camps.

"Of the numerous camps and shack colonies which have lately appeared along the shores of Narragansett Bay and other waters of the State all are not the product of the past few years, as is commonly supposed. Some of these colonies have been established for many years, and season after season families have returned to the same spots to spend the summer months away from the heat and oppression of the city. However, it is only during the last half dozen years that the camp idea has become so generally popular. Colonies large and small are dotted along the bay from Pawtuxet to East Greenwich on the west shore, and as far as Bristol on the east. Below these points there are other camps, but of much smaller size, with tents varying in number from one to five or six, more widely scattered along such waterways as the Narrow River. Naturally the persons doing daily work in the cities seek a spot which is readily accessible and to which the transportation cost is small. Therefore, the more crowded localities are met with nearer the limits of the city of Providence.

"Besides the larger colonies, which are used for summer homes by the various families, there are many smaller settlements which are established by various institutions, *e. g.*, churches, Young Men's Christian Associations, Girl's Friendly Societies, etc. There are camps for girls, camps for boys and camps where weary mothers may leave their infants during the heat waves, all under proper and excellent supervision.

"It has been the aim of the State Board of Health to make as complete an investigation as possible of all of these colonies, with an eye for the general sanitary arrangements, the water supplies, milk supplies, fly nuisances, etc. Also to determine if proper grounds have been selected by the casual camper and to determine whether or not in these places the colonists have not, by crowded conditions, defeated their object—the search for health.

"In general, it may be said that the localities seem well chosen. Many of the places are leased for the season from persons who own and set aside tracts of land for camp purposes. The camps are

nearly all established on good land, dry, and have ample facilities for unpolluted water.

"The homes consist mostly of tents and one-story bungalows of cheap, but of substantial construction. In very few camps are conditions crowded, and then not dangerously so, provided that rules as to garbage and camp waste disposal, privy vault locations and construction are regarded. The larger camps have such regulations, which must be obeyed or the offender is denied the use of the grounds.

"Garbage in the larger camps is collected by the owner, or pits are dug in proper places and these burned out at regular intervals or filled in as conditions demand. In the smaller camps where there are perhaps from one to ten tents or bungalows the individual campers dig their own garbage pits, filling in with earth or sand.

"Water is secured from wells, driven or dug at different spots around the camps. In some cases springs are used. The inspector has tried to see all of these various sources, to warn against the use of those improperly situated and to suggest proper sites. Whenever possible, water from doubtful sources has been tested at the laboratory of the State Board of Health, and when results have warranted, water has been commended or condemned.

"One or two large camps have a good city supply on tap on the grounds.

"Privy vaults have received especial attention, both as to their construction and maintenance and their relation to the water supplies. Whenever necessary the inspector has tried to see negligent owners and explain proper methods for the care of this most important feature from the health standpoint. The fly nuisance also comes up in this connection, and it may be said that flies do not appear to be more numerous around these camps than in many more pretentious summer settlements. In colonies so situated that summer winds prevail, there are actually very few flies, and in those camps where garbage and privy vaults are somewhat neglected, the State Board of Health has endeavored to correct this state of affairs by explaining to the owners the dangers connected.

"The following is a list of the larger and more important camp colonies inspected during the summer of 1912, together with some estimates as to the number of tents, bungalows and persons in camp. It is obvious that the figures change from week to week, and even from day to day, by the fact that in some instances campers are on the grounds for only a few days at a time. A great many camps are left out of this list because they consist of only a tent or two and are so scattered that they cannot be well classified. Whenever in his various trips the inspector passed one of these smaller places he covered the grounds in the same way as with the larger and more congested camps. Obviously it has been impossible to reach those persons, mostly small boys, who have pitched tents for a few days in out-of-the-way sections.

Town. Camp.	Bungalows.	Tents.	Persons.
WARWICK:			
Longmeadow (Rookes')	21	6	109
Longmeadow (Alexander's)	1	7	28
Highbanks	0	16	64
Coles'	56	52	425
Rocky Point	65	48	550
Sheldon's	1	6	25
Mitchell's	0	5	20
Buttonwoods	1	28	140
Gaspee Plateau	0	10	32
Warwick Downs	95	45	600
			1,993
WEST BARRINGTON:			
Jolly	2	4	15
Lavin's	0	10	30
			45
BARRINGTON:			
Bishop Harkins'	1	4	88
EAST PROVIDENCE:			
Camp White*	0	38	190
Jolly	0	9	36
Wannamoisett Plat*	0	5	30
Richmond Terrace	0	1	3
Pine Crest Plat	7	11	65
			324

Town. Camp.	Bungalows.	Tents.	Persons.
BRISTOL:			
Y. M. C. A.	0	10	40
Tobin's	0	1	3
			43
SAUNDERSTOWN:			
Galahad	1	4	30
Newport Y. M. C. A.	0	5	25
Emmanuel	0	3	20
			75

Estimated number of persons in camp colonies, 2,568.
Isolated and scattered parties not considered here.

*Cottages omitted.

EDUCATIONAL METHODS.

The use of pamphlets, dodgers, folders and pictures has been utilized for instruction in health matters. As in any business advertisement, a printed presentation of the wares which one has for sale or to give away is the quickest means of reaching a large number of persons within a short space of time.

It is the purpose of boards of health to educate the people in health matters. It has up-to-date advice for free distribution and much of it can be placed in printed form for those who are willing to read and learn. As with any form of advertisement, although only a small fraction of the material issued may receive consideration, yet the amount of attention received warrants the expenditure.

A great deal of success in this line depends upon whether the subject may be made attractive either by the form of the matter presented or with the assistance of illustrations. At the present day material of this kind must be novel, new to the reader, and even startling to command attention.

As a means of instructing the public in sanitary matters there is probably no more successful way in holding attention than by direct verbal address.

The principal lines of instruction for which literature has been issued has been on tuberculosis, flies, individual drinking cups and typhoid fever. In addition to the set of stock forms of instruction, novel post cards have been utilized, some being colored lithographs, and others having reading matter concerning some health subject concealed beneath an illustration, the concealed matter being revealed by rubbing a pencil across the surface of the illustration.

The interest in developing the concealed subject matter attracts attention and the reading matter is gone over many times, which would not be the case if it was plain printed matter.

Circulars prepared by the State Board of Health were extensively used in the educational campaign conducted in Smithfield, in March, by the newly formed Smithfield Public Health Association.

In Johnston, the Public Health League conducted active campaigns to educate the mill workers and the circulars and exhibits of the State Board of Health were used.

LECTURES.

Lectures were given on various health topics during the year. A series of seven lectures was given by the Secretary of the Board to the scout masters of the several Boy Scout Companies, there being an average attendance of fourteen, upon the subject of "First Aid to the Injured." The purpose of these lectures was to familiarize the scout masters with the subject in so thorough a manner that they would be enabled to instruct their troop with as much or little on first aid as might be practicable according to the age of the members. The lectures were illustrated with charts of large size, with portions of human skeleton and emergency surgical appliances. Each pupil was required to demonstrate at each lecture the result of the knowledge acquired by application of improvised tourniquets, the application of splints, utilizing as far as possible the triangular bandage. All conditions of medical or surgical emergencies or accidents were considered. In addition the State Board of Health presented to each troop a set of charts issued by the American Red Cross Society, believing that the constant reference to them in the troop quarters would serve as a far reaching and long continued instruction in matters of conservation of health and life.

February 12th was set apart by the School Committee of the city of Cranston as "Health Day," a talk on health matters being given by the teachers in the several schools to the pupils. The Secretary of the Board, upon request of the Principal of the Cranston High School, delivered a lecture upon general sanitary matters to the teachers and pupils of that school.

At a meeting of the Rhode Island Anti-Tuberculosis Association held in Calef's Hall, Thornton, March 14th, in the interest of the educational campaign to prevent the spread of tuberculosis, Dr. Gardner T. Swarts and Dr. Charles T. Barnard gave addresses. In addition, moving pictures were shown on a screen under the direction of the Secretary of the Board. The campaign was carried to the mill gates at noon by the Association and printed matter was distributed to the workers as they entered or left their places of employment.

March 31st, a similar talk was presented by the Secretary at the Pocasset Social Club, which is made up of operatives working in the locality.

April 17th, a lecture was given by the Secretary on Tuberculosis, Milk, and Flies as carriers of disease, at the annual meeting of the East Providence District Nursing and Anti-Tuberculosis Association at the High School.

April 25th, a lecture on Tuberculosis was given by Dr. Jay Perkins at the Technical High School.

April 26th, a lecture on Eugenics was given by the Secretary to the Churchmen's Club of the Calvary Baptist Church, in Providence. Much interest was shown in the lecture by the audience, comprised entirely of men.

On March 30th, a talk on Tuberculosis was given by Mr. Wallace Hatch, Secretary of the Rhode Island Anti-Tuberculosis Association, in Bernon Hall, Georgiaville.

June 1st, an interesting talk was given to the mothers of the school children of the Charles Street School, by Mrs. Ira D. Hasbrouck of the Woman's Club, the subject being "The preparation of food for babies, the care of the babies milk and the treatment of infantile disorders."

June 4th, Mrs. Hasbrouck delivered a similar talk to the children at the America Street School. The Board assisted in both cases with lantern slides and operator.

July 3d, in response to a request from the Edgewood Improvement

Association, a lecture was given by the Secretary at the Edgewood Grammar School, on the Fly Pest and a Pure Milk Supply. The Association was carrying on an anti-fly crusade, utilizing the Boy Scout troop of that district for coöperation.

November 4th, the Secretary presented the subject of Leprosy at a regular meeting of the Providence Medical Association. Since there is a constant possibility of cases of leprosy being discovered in the State, among our citizens as well as aliens, it is desirable that the medical profession be familiar with the symptoms and physical appearance of this disease. Although there have been but five cases discovered in the State during recent years, yet the disease is so insidious in its advance that the average physician might not recognize it unless occasionally reminded of its character.

The subject was illustrated with lantern slides, showing the different stages and forms of this disease from the mildest to the most severe and destructive forms.

November 26, a talk was given by the Secretary at the Technical High School, in Providence, to the parents of the pupils and others. The subject was on Hygiene and Sanitation.

A lecture on Tuberculosis was given by the Secretary at the Eden Park Church before the local Anti-Tuberculosis Association, at its annual meeting.

As an aid in stimulating interest in the sale of the Red Cross or Christmas Seals, and as an opportunity to further instruct the public on the subject of tuberculosis, the Board secured the privilege, through the courtesy and assistance of the Outlet Company, in Providence, to display moving pictures and lantern slides on the front of their large department store on one of the largest and widest thoroughfares of the city. The company not only provided and erected the screen, but also gave the privilege of using one of their halls on the opposite side of the street for placing and operating the lantern. By this means many persons who would not take the time to consider the subject of tuberculosis and the campaign with Red Cross Seals, were attracted and interested.

NUISANCES IN ARCTIC, WARWICK.

Upon request of the health officer of the town of Warwick, Dr. Charles E. Chagnon, the Secretary made two inspections in conjunction with that officer of certain nuisances existing in the town, and located in that portion of the town known as Arctic. The Secretary also, upon request for assistance of the health officer, was in attendance when the cases were brought before the district court. The nuisances were found on premises located in the rear of the Warwick Hotel.

There was found a barn at least 50 feet square, the cellar of which had a small accumulation of barn wastes. This cellar at the time of the first visit was filled to the depth of 2 feet; at the second visit there was a diaphragm pump located at the opening of the cellar, indicating that the previous accumulation had been mostly removed. The height or depth of the previous mass was indicated by a dark marking on the supporting posts in the cellar.

A barn about 30 feet square within a very few feet of the above mentioned one, contained a cellar which was flooded to a depth of 2 feet, with the drainage from the floor above occupied by horses, as indicated upon a ladder which could be withdrawn from the mass.

A trench leading from this barn flowed into a cesspool at the side of a small alleyway and by an extension of the trench into a second cesspool, both of which were filled with a putrifying, gas-forming muddy mass of barn refuse.

From the second cesspool a small overflow trench delivers into a gutter at the side of the alley. The fluids then pass through a wooden drain, from there through a trench, then through a wide field where, during heavy rains, they are carried to what is called "the brook," which was a deep irregular trench, having no contin-

uous grade and permitting of large pockets of accumulated wastes at intervals along the so-called "brook." This "brook" receives a surface wash of a discharge from trenches along this line. In the "brook" were large collections of dark offensive material located within 20 feet of dwelling houses.

Into the gutter of the lane there also flowed the waste from refrigerator refuse from an ice cream factory. This found its way into a wooden drain to which we have previously referred.

The adjoining premises were also inspected. Here was found a large cistern-like cesspool about 12 by 21 feet in area, covered by a wooden shed-like structure, the sides of which were broken. The depth of this could not be estimated, but the mass of decomposing septic sewage permitted offensive gaseous odors to generate as the result of so-called "septic action" of the mass. This mass was about 1½ feet from the surface of the ground.

This pit, the Secretary was informed, received the wastes from the Majestic Building, and the owner of the property had been given permission by the town to establish and maintain a cesspool at this point. An overflow drain delivered from this cesspool into a trench which leads to the brook.

DISEASE IN ANIMALS.

A portion of the original law relating to the work required of the Board of Health included investigation of the subject of diseases among cattle or other animals. When the Board of Agriculture was formed this department did not attempt to duplicate the work being done by the newly established Board. Interest and study of disease of animals is therefore considered only so far as such diseases may be communicable to man, as in tuberculosis, rabies, glanders and trichinosis, the last two occurring but seldom in man.

On account of the possible transmission of tuberculosis from bovine animals to man through the milk, especially to children,

the activities of the Board of Agriculture in its endeavor to minimize the extent of tuberculosis in cattle, is of interest.

Statutory provision is made for the examination of animals suspected to be affected with tuberculosis. The examination is made by an inspector of the Agricultural Board upon request of the owner of the suspected animals. If the animal proves to be diseased and is ordered to be killed by the Board, the owner receives compensation of one-half of the appraised value of the animal.

During the year 1912 there were 427 cows, 3 oxen, 3 bulls and 2 swine killed, having been found to be suffering from tuberculosis. The half valuation allowed upon these animals amounted to $9,160.50.

THE WORKING OF THE MEDICAL PRACTICE ACT.

EXAMINATION OF APPLICANTS.

Under the act controlling the practice of medicine in this State, which was passed in 1895, provision was made that certificates or licenses to practice medicine should be issued to all persons who had been in practice for three years previous to the passage of the act. This necessarily included a certain number of ignorant practitioners and charlatans who had no medical education. Any regular physician, whether previously in practice in the State, or on coming into the State and presenting a diploma from a medical school in good standing, recognized by the Board as such, was also entitled to receive a certificate. Certificates different in form and appearance were issued to these two distinct classes of practitioners. The first form was known as a "time limit certificate." If the school had no standing whatever, or the applicant was a non-graduate, such applicant was required to take a full examination in the several branches of medicine. If the school from which he graduated had a fair standing only a supplementary examination was required in the three principal branches.

It was assumed if the applicant showed a good average knowledge of the three most important branches that although the school from which he graduated did not give a full four-year course, yet it might have given a satisfactory preparation to the applicant. In October 1907, the required average was raised from 75 to 80 per cent.

The examinations were presented in writing. The full examinations included questions in the branches of Anatomy and Physiology, five questions each; Chemistry and Materia Medica, five questions each; Theory and Practice, ten questions; Surgery, ten; Obstetrics

and Gynæcology, five each; Pathology, ten; and Hygiene and Medical Jurisprudence, five each. A general average of 80 per cent. of correct answers was required. The supplementary examinations included only Theory and Practice, Surgery, Obstetrics and Gynæcology.

In 1908 the law was changed, providing that an examination be required from all applicants, and that applicants present evidence of having graduated from a medical school in good standing. This examination included all the subjects named above.

During the present year there were 53 applications, action upon which was as follows:

EXAMINATIONS, 1912.

Passed first examination	34
Passed second examination	1
Passed seventh examination	1
Passed first examination. (Oral)	3
	39
Failed on first examination	10
Failed on second examination	1
Failed on fourth examination	1
Failed on sixth examination	1
Failed on seventh examination	1
	14

Percentage of applicants passing (39 out of 53) = 73.5 per cent.

The following table gives the percentage acquired by the applicants coming from different schools and it is interesting to note that the average percentage of those who passed is considerably higher than the required 80 per cent:

RESULTS OF EXAMINATIONS DURING 1912.

NAME OF COLLEGE.	Number Passed.	Percentage.	Number Failed.	Percentage.
DISTRICT OF COLUMBIA:				
Georgetown University	1	80	1	71.6
George Washington University	1	89.2	....	.....
MARYLAND:		88.1	....	.....
Baltimore Medical College	3	90.7	1	68.9
		88.8	....	.....
		85.9	....	.....
College of Physicians and Surgeons	2	83.5	....	.....
MASSACHUSETTS:		84.	....	.....
		81.	....	.....
Boston University	3	83.7	....	.....
		90.2	....	.....
		80.		76.5
		84.7		72.4
Harvard University	6	88.2	3	76.2
		85.7		
		86.2	....	.....
		83.	....	.....
		82.		
		84.6		
		83.		73.6
		82.3		77.5
Tufts Medical College	9	83.4	4	77.5
		86.5		79.3
		88.		
		85.2	....	.....

RESULTS OF EXAMINATIONS DURING 1912.—Concluded.

NAME OF COLLEGE.	Number Passed.	Percentage.	Number Failed.	Percentage.
NEW HAMPSHIRE:				
Dartmouth Medical College	2	89.4 80.	....	.....
NEW YORK:				
Bellevue Medical College	1	81.8	....	.....
Jefferson Medical College	3	90.6 90.9 84.	.... 1	..... 78. .....
Medico Chirurgical College	1	81.4	1	77.0
University of Pennsylvania	1	89.	....	.....
VERMONT:				
University of Vermont	2	86.2 82.	2	76.1 69.
CANADA:				
Laval University	2	80. 81.4	1	75.0
McGill University	2	88.7 80.		....
Totals and Averages	39	84.9	14	74.9

By reference to the foregoing tabulation it may be determined which of the various schools are graduating the best students. The record of these results for a year, or for several years, presents the quality of medical education of these schools. There may be occasion-

ally a graduate from the best schools who under the stimulus of the final examination at his school may succeed in passing, but when tested by a set of practical questions, and removed from his alma mater, fails to express the knowledge which he may possibly have acquired. But when a succession of applicants from the same school can manifest a lack of knowledge on the everyday happenings in medicine, it leads one to infer that such a school is not giving the student a fair exchange for the time and money spent in his course in that school. The criticism that perhaps the examining board presents too stringent an examination, or that they are too strict in their markings, may be refuted by comparison of the results which comparison is made possible by this table.

If seven to eight out of ten applicants secure good results on their first examination, it would seem as if the minority might be able to make a better showing.

If medical schools were conscientiously alive to the interests of their institutions they might readily, by reference to the reports of the several examining boards, determine their position in comparison with other schools. If they desired to advance the standard of the school they might further ascertain in what branches their graduates failed to pass and improve the character of instruction along the weak lines.

MEDICAL PRACTICE ACT.

At the January Session of the General Assembly a bill creating a State Board of Registration of Osteopathy was introduced through the efforts of the Rhode Island Osteopathic Association. This bill like other bills presented for the same purpose for many successive years before, was to govern the practice of osteopaths of whom there are about twenty practicing in the State. It provided for a board of examiners from among this number, who should issue certificates to all those who might be practicing at the time of the passage of the act regardless of their knowledge of medicine, or of osteopathy

even, to examine all subsequent applicants for certificates as to their qualification as osteopaths. The only limitations made to those not possessing certificates to practice medicine, were that they should not perform major surgery nor use drugs. At the present time it is held that the practice of osteopathy is the practice of medicine and that all who are now so practicing are doing so contrary to law and are open to prosecution.

At a public hearing granted before the Judiciary Committee of the House, there was a considerable divergence of opinion. In opening the discussion, Percy W. Gardner presented a brief in behalf of the act from the Rhode Island Osteopathic Society, prepared by the law firm of Wilson, Gardner and Churchill. Those in favor of the act urged in effect, that osteopathy is a separate school of medicine and should be recognized as such by the State.

Dr. Gardner T. Swarts, Secretary of the State Board of Health, strongly opposed certain features of the act, but was not altogether opposed to the passage of a similar act if drawn to adequately protect the public. Among the others who opposed the act were Dr. G. Alder Blumer of Butler Hospital, Dr. F. B. Smith of Washington, representing the Kent County Medical Association, and Dr. Frederick N. Brown. The act was not reported back from the committee.

In order that an osteopath or any particular or peculiar form of practice might receive the benefits of the present medical practice act under terms more clearly defined than at present, an amendment to the present medical practice act was introduced in the House of Representatives defining the practice of medicine as:—

"The practice of every branch of the healing art, including all treatment for the correction or improvement of any abnormal condition of the human system, whether by mechanical means, by the use of appliances, or otherwise, and whether or not drugs be prescribed or administered." This naturally was opposed by the Osteopathic Association and received no action.

The case of State vs. Frank Siveny, who was tried and convicted before a jury in the Superior Court for practicing medicine and surgery without a license from the State Board of Health, was argued April 26, 1912, before the Supreme Court upon the defendant's bill of exceptions. The State showed that the defendant occupied an office in the Cæsar Misch Building, in Providence, and had on his door the words, "Dr. Siveny, Chiropractor." At the trial much testimony was offered tending to show that people had been relieved or cured of ills by the treatment received from the defendant, but this line of testimony was ruled out by Judge Lee, who presided at the trial.

The Secretary of the State Board of Health, as required by the General Laws, was the complainant in the case. The Sixth District Court, where the complaint was first heard, found the defendant guilty, and he was later tried in the Superior Court before Judge Stearns and a jury, resulting in a disagreement. Counsel for the defendant claimed that the evidence failed to show that the "adjustments" practiced upon the spinal column of Dr. Siveny's patients were in violation of the law against the practice of medicine and surgery without a license.

MISCELLANEOUS.

In addition to the regular work of the Board of Health many matters which may be classified under the head of "miscellaneous" were conducted during the year 1912. Many other matters, not directly connected with the work of the Board, but highly important to the general health of the people of the State, should be recorded.

On June 10, 1912, the city of Providence formally turned over to the United States Officials the quarantine department at the port of Providence. Dr. R. H. Creel of the Marine Hospital Service was assigned as head of the department.

FACTORY INSPECTION.

In the annual report of the Chief Factory Inspector for 1911, presented to the General Assembly in January of 1912, a physical test for children allowed to work is recommended. The report shows that there are almost as many girls under 16 years of age working in the factories and mills of the State as there are boys of that age. It also shows that mature women form about one-third of the total number of adult operatives.

PURE FOODS.

A Pure Food and Domestic Science Exposition was held in Providence for two weeks, commencing February 19, 1912, under the auspices of the wholesale and retail grocers, butchers, marketmen, and the Rhode Island State Federation of Women's Clubs. The examination and control of the sale of foods and drugs is under the control of the Pure Food Commission of the State.

MOSQUITO EXTERMINATION.

Through the efforts of a summer resident of Newport, Edwin M. Skinner of New York, an expert in drainage and the elimination of breeding places for mosquitoes, visited Newport June 21st, to make an investigation to discover if possible a way of ridding Newport of the mosquito. The investigation was of a private nature conducted by a few of the citizens of that city.

Efforts for the suppression of the mosquito as a nuisance were made in other localities.

PLAGUE.

Early in July Bubonic Plague appeared in the ports of Porto Rico and Havana, and it was feared that it might spread to Providence and Rhode Island by way of vessels coming here. It was not felt that the situation demanded a widespread examination, and the Providence Health Department conducted bacteriological tests upon rats collected from along the waterfront to see if any traces of the plague could be found. The disease was not discovered in any of the rodents examined and not a case was reported here.

HEALTH OFFICERS' MEETING.

The fourth annual meeting of the health officers of the State was held August 15th, at Rocky Point, under the auspices of the State Board of Health. Dr. Charles V. Chapin spoke on "Prevention of Typhoid Fever," and an informal discussion followed in which many points were brought out which should materially assist in preventing the spread of that disease. Following this, moving picture films were presented giving illustrations of sanitary matters, one of which was a demonstration of the impurities which might be found in drinking water and the effect of filtration in purification of such water. Another film showed the conditions to be found at dirty milk farms and dairies, the serious results of using milk from such dairy and the improvement of the same farm as the result of in-

troducing cleanliness and sanitary methods in handling the milk. Practical methods in producing and distributing pure milk were outlined by Dr. Gardner T. Swarts, his lecture being illustrated with lantern slides.

SPINAL MENINGITIS.

During the fall of 1911 and the early months of 1912, the physicians of the Naval Hospital at Newport, had under their care several cases of spinal meningitis from among the seamen apprentices at the Naval Training Station. Only one of the cases proved fatal and the physicians were pleased with the result of their treatment.

UROTROPIN.

It is of value to know that Dr. Simon Flexner of the Rockefeller Institute for Medical Research, late in February, 1912 made an announcement concerning the drug urotropin, a trade name for hexamethylenamine, sometimes called formin, which he declared would probably be the medical combatant of the future for the germs of infantile paralysis. Dr. Flexner declared that the drug appears to be the only one the properties of which make it a foe to the germs producing infantile paralysis.

"I think it will be only a short time before urotropin will be the means by which we can control this disease," said Dr. Flexner. Certain experiments upon monkeys and apes were explained in the statement, after which it continues:

"Certain it is that this drug comes near to being a powerful agent for the destruction of the paralysis germs. We have no serum that we can safely say is a direct control of the disease, but in urotropin lies our hope. Experiments with this drug indicate that our hopes are not based on too fragile a foundation. Besides we have three or four other drugs, but none gives us the hope that urotropin does. Our experiments have been conducted mostly on monkeys. It is a peculiar fact that our experiments on monkeys prove far more beneficial and instructive than similar investigations and experiments with the human species."

THE "KISS OF DEATH;" THE WEAVING SHUTTLE.

A bill prohibiting the use in factories and mills of a shuttle which could be threaded by suction of the mouth, was introduced at the January Session of the General Assembly. At a hearing held by the committee to which it was referred, there were few advocates of the bill. The argument was presented that the shuttle developed the possibility of transmitting communicable diseases, particularly tuberculosis, as a result of the indiscriminate "mouthing" of the shuttle by different operatives. Cases have been reported where it was presumed that the direct infection was communicated in this way. A device was presented which automatically accomplishes the threading of the shuttle without the use of the mouth for suction, and it was stated that the device was being successfully used in several mills.

One or two representatives of mills in this State appeared in opposition to the act. It was stated that the device was impracticable and that if provided the operatives would refuse to use it, preferring to suck the thread through the eye of the shuttle, from habit, and because it was the easiest way. The committee did not see fit to report the act to the General Assembly for consideration.

PTOMAINE POISONING.

During the first few months of 1912 three separate attacks of illness were reported as presumably due to poisoning from food eaten. May 21st, six members of the Ninety-Seventh Company, Coast Artillery, U. S. A., at Fort Adams, were reported ill from eating bad food. Nearly all the members of the One Hundred and Twenty-Ninth Company became ill from eating canned salmon; sometime later sixty members of the One Hundred and Second Company were made ill from bad vinegar.

REGULATION OF PRACTICE OF TRAINED NURSES.

As a protection for the public against the engagement of unskilled nurses who might be called upon in serious or mild cases of illness,

in April the General Assembly enacted a law creating a Board of Examiners of Nurses. This act, in brief, provides for the registering of nurses and gives those who have become duly registered with the State Board of Registered Nurses the right to use that title and the initials R. N. No person not a registered nurse may claim such title or use such initials. The law does not prevent the use of the title "Trained Nurse," when one has the proper qualifications, but no trained nurse may be called registered except having qualified before the State Board of Examiners of Nurses.

On April 25th, His Excellency Governor Aram J. Pothier, as directed by this measure, appointed the members of the new board as follows: Dr. Dennett L. Richardson, Superintendent of the Providence City Hospital, for a term ending January 31, 1913; Evelyn C. V. Mulrennan, head nurse at St. Joseph's Hospital, for a term ending January 31, 1914; Lucy C. Ayres, matron of the Woonsocket Hospital, for a term ending January 31, 1915; Winifred L. Fitzpatrick, assistant superintendent of the Providence District Nursing Association, for a term ending January 31, 1916; Dr. Henry C. Hall, of Butler Hospital, for a term ending January 31, 1917.

The Pawtuxet Valley District Nursing Association, early in January, came to the conclusion that it had need of a fourth nurse in the Valley. The Association at that time employed three other nurses, two general nurses and one specially for tuberculosis patients. The employment of this extra nurse was to allow the extension of the nursing work into Natick village.

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